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ABSTRACT

A brief introduction states the purpose of and summarizes the five presentations made at a Southwest Educational Development Laboratory Regional Exchange (SEDL/RX) Project conference and notes that the SEDL/RX publication, "Evaluation of Educational Software: A Guide to Guides," was produced for use as a reference guide by participants in this conference. In the keynote address, the only presentation for which the full text is included, Vicki Blum Cohen describes a learner-based courseware evaluation project which was conducted in 1982 at the Microcomputer Resource Center of Teachers College, Columbia University. Supplementary materials are provided for the remaining presentations, which included a description by Vicki S. Smith of the Texas Education Computer Cooperative's training process for its network members in 20 regional education service centers; a lengthy teleconference presentation by Pristen Bird on approaches to the evaluation of educational software in Florida; Bruce Hagen's teleconference presentation of more than an hour on activities in California, including the 15 regional Teacher Education and Computer (TEC) Centers and the California Software Clearinghouse; and Patricia Sturdivant's explanation of the Houston Independent School District's participation in the Urban Technology Consortium of six school districts around the United States which provides for mutual exchange of software reviews. The conference program, names of participants, and a 19-page list of software evaluation resources complete the volume. (LMM)

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R&D SPEAKS:

EVALUATION OF EDUCATIONAL SOFTWARE

SOUTHWEST EDUCATIONAL DEVELOPMENT LABORATORY
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FOREWORD

The SEDL Regional Exchange (SEDL/RX) Project provides information and technical assistance services to educators in six states: Arkansas, Louisiana, Mississippi, New Mexico, Oklahoma, and Texas. It is one of seven Regional Exchanges in the nationwide Research & Development Exchange (RDx), funded by the National Institute of Education, which lists as a major goal the dissemination of information about educational research and development (R&D). To assist in accomplishing this goal, the SEDL/RX staff designed and sponsored the R&D SPEAKS: EVALUATION OF EDUCATIONAL SOFTWARE conference in Austin, Texas on March 16-17, 1983. In an effort to record and pass on to others some of the experience and knowledge that was shared during that day and a half meeting, this docoment was developed.

This is the tenth of a series of R&D SPEAKS conferences sponsored by the SEDL/RX. These conferences provide opportunities for sharing, communication, and growth among researchers and members of the education community.

Preston C. Kronkosky
Executive Director
Southwest Educational Development
Laboratory

ACKNOWLEDGMENTS

I want to thank the staff of the SEDL Regional Exchange for their help in preparing for and convening this R&D SPEAKS: EVALUATION OF EDUCATIONAL SOFTWARE conference. Special thanks is extended to Nancy Baker Jones, whose final task as Regional Exchange Project Coordinator was to serve as conference planner. The conference itself was based on the synthesis document Evaluation of Educational Software: A Guide to Guides, of which she was co-compiler with Larry Vaughn of Northeast Regional Exchange, Inc. This conference, as is true of all her work with the Regional Exchange, demonstrated her great concern for integrity of content and sound educational applications of technology in education.

I also wish to thank each of the presenters, particularly Pristen Bird and Bruce Hagen who made outstanding teleconference presentations with only a few hours' notice when Dr. Sandra Turner became ill. Thanks are also due to the following: Sandy Pratscher, who helped coordinate this conference with the Texas Computer Education Association's (TCEA) statewide meeting March 18-19; Jim Savoie and Sherry Rylander of Tandy Corporation, who set up and demonstrated a network of ten TRS-80 Model III computers for the meeting; and Bill Bennett of Random House, who arranged for sample software to be used by conference participants. Thanks goes to the following SEDL/RX staff: Administrative Secretary Ginger Pfister, who patiently dealt with all the details of conference planning and execution; Technical Writer Diane Downing, who prepared these conference procedings; and Administrative Assistant Barbara Lecroy, who formatted and produced the document.

Martha L. Smith
Project Director
Regional Exchange Project

INTRODUCTION

Because of the explosion of microcomputers in public schools, the evaluation of software used in those microcomputers has become an important issue. In response to its Advisory Board's interest in the subject the Regional Exchange Project designed a conference, "R&D SPEAKS: Evaluation of Educational Software," held March 16-17, 1983 at SEDL. This conference was designed to provide educators from the six-state SEDL region with the opportunity to meet with researchers and practitioners experienced in evaluating software. In addition to this conference, the Regional Exchange produced a reference guide used by conference participants, EVALUATION OF EDUCATIONAL SOFTWARE: A GUIDE TO GUIDES, which contains ten major evaluation systems, model evaluations, a rationale, and resources for further study. As a follow-up to this "R&D SPEAKS," the Regional Exchange will also produce a training module on software evaluation.

"R&D SPEAKS: Evaluation of Educational Software" was structured to provide participants with an overview of state-of-the-art research and with models for software evaluation used in Texas, Florida, and California. Participants also evaluated software, using a variety of evaluation systems, in an application laboratory.

Dr. Vicki Blum Cohen, director of instructional design for a New York-based communications company now developing interactive video disc programs, presented the conference keynote address and directed the application laboratory. Cohen stressed the importance of and potential power of evaluators of software. "Computer-based instruction is a software-driven field," she said. Because the microcomputer is only as useful as the software used in it, the role of the people who choose that software becomes particularly significant. Cohen also stressed the importance of evaluators, in this case staff of schools or school districts, having their own clear criteria for what they are looking for and not relying on evaluations produced by outside sources. "Software must fit your own needs," Cohen said, "but keep in mind that this is a fluid market. Standards for software will change as the technology becomes more sophisticated." Cohen presented to the participants the results of her research in software evaluation which involved teams of teachers, instructional designers, and subject matter experts. She also listed specific elements of well-designed software. The basis of her remarks, later presented to the 1983 meeting of the American Educational Research Association, are reproduced here.

Vicki Smith, coordinator for computer-based instruction with the Region IV Education Center, Houston, described the process by which the Texas Education Computer Cooperative she coordinates trains its network members in the 20 regional education service centers throughout Texas. Texas' approach to evaluation is based on specific criteria for evaluating software related to the state's standardized assessment test of basic skills.

Pristen Bird, instructional computing consultant with the Florida State Department of Education, described state activities and the department's relationship with the Florida Center for Instructional Computing (FCIC) at the University of Southern Florida. The Florida SDE approves district hardware and software purchases, negotiates discount purchase agreements between computer vendors and districts, shares computing resources, and provides technical assistance. The FCIC, funded by the state department, indexes and evaluates courseware, provides a micro laboratory, and annually surveys the instructional uses of computers in the state.

Bruce Hagen, staff development consultant with the California State Department of Education, described the California Software Clearinghouse and the state's 15 Teacher Education and Computer Cooperative Centers (TECC). TECC centers provide staff development in a variety of areas, including computing. The Clearinghouse, funded by the State Department, has established a cadre of software evaluation specialists in the TECC centers, has created a preview guide of software, provides a rotating collection of software for the TECC centers, and collects and disseminates software evaluations.

Patricia Sturdivant, associate superintendent for technology with the Houston Independent School District, described the district's participation in the Urban Technology Consortium of six school districts around the U.S. The consortium provides for the mutual exchange of software reviews, using the form developed by the Educational Products Information Exchange (EPIE). Evaluators in each participating district review progams and submit them to EPIE, which then disseminates them.

Materials for the state and school district approaches are included in these proceedings, along with the conference program, names of participants, resources for software evaluation, and conference evaluation.

A LEARNER-BASED EVALUATION OF MICROCOMPUTER SOFTWARE

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A LEARNER-BASED EVALUATION OF MICROCOMPUTER SOFTWARE*

Introduction

This paper describes a funded project by Exxon Education Foundation that took place in the Microcomputer Resource Center at Teachers College, Columbia University, during the year of 1982. The project was involved in evaluating microcomputer courseware being marketed for school use. An integral part of the project was incorporating learner-based feedback into the evaluation process by trying the program out on those learners the courseware was designed for. This information was then used to verify or refute the findings of the evaluation team and was included in the final report. The evaluations were compiled into a "profile" system and disseminated by the Educational Products Information Exchange (EPIE) Institute to school districts across the country.

Theoretical Framework

With the proliferation of microcomputers into the classrooms of schools, there has been a commensurate proliferation of educational software which is starting to flood the market. Software and courseware have become the newest phenomenon in the publishing industry. While a year ago most publishing companies were watching the microcomputer market with trepidation and hesitation, today they are committed to producing software products and acquiring a part of a fertile and promising market.

The boom in software sales has also created a variety of new companies, most of which initially started as small cottage industries, producing software in their livingrooms and dens. The number of new companies that constantly emerge is in amazing proportions and daily some new product from an unknown firm emerges on the market.

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* This paper was presented at the annual meeting of the American Educational Research Association, °Montreal Quebec, 1983.

The lack of quality software on the market has been documented (Blum Cohen, 1982). Much of the software produced is not instructionally effective and does not utilize the full potential of the technology. There is a great need for the evaluation of software which provides consumers and producers with qualitative information about the products. At this point in time it is necessary to positively direct the market toward a direction of quality and educational effectiveness.

Recognizing the need for such evaluation projects, there has been much difficulty in developing standards and evaluation procedures (Roblyer, 1981). There appear to be widely differing opinions about what the "ideal courseware product" should be, and what we should be aiming for in the way of courseware of the future. As criteria emerge, the market changes and new products with unique features are produced, making the criteria somewhat obsolete. It is therefore important that any guidelines and criteria be flexible, fluid and valid indicators which reflect the current state of a changing market.

Criteria and guidelines for evaluating software have been developed in the past year (Blum Cohen, 1982; Gagne, Wager and Rojas, 1981; Heck, Johnson and Kansky, 1981; MicroSoft, 1982). Although there may be disagreement about many of the issues, there is a fundamental similarity that runs among them concerning many of their criterion items. Most important is that standards are starting to exist which are defining this new technology in terms of educational effectiveness. It is mandatory that evaluation projects occur so that these standards can be utilized, tried, and altered according to the market. They must not stand in isolation, as rigid theoretical constructs, but be allowed to grow, change and be revised to reflect current standards.

Two extremely important sources of information that must be tapped during the evaluation process to ensure that the criteria are significant and that the evaluations are valid are: 1) a practicing teacher and 2) a learner that the product was designed for. By using a classroom teacher as an evaluator the process becomes a closer approximation to the actual setting where the software product will be used. The teacher/evaluator can provide essential input about the validity of the program in a classroom environment and judge whether the product would actually work with students and teachers. S/he would provide invaluable comments about teacher training, integrating the program into the curriculum, ease of implementation, and pedagogical concerns. The learner provides invaluable insight into how the software product will be received and can validate many of the evaluators' findings. Trying the program out with learners allows the evaluation team to subjectively judge the instructional effectiveness of the product by obtaining information about motivational factors, likes and dislikes, and student preferences regarding learning. There is no other way of attaining such insight, and it forces the evaluation team to utilize a much more applied, almost institutional approach to evaluation.

The evaluation project described in this paper is based upon the above considerations; the paper will describe them in further detail.

The Evaluation Procedure

The evaluation project at the Microcomputer Resource Center, Teachers College tried to address many of these issues by establishing a learner-based evaluation procedure. A similar study had been conducted in 1981 at the MRC (Blum Cohen, 1982) which had evaluated the first educational software products to emerge on the market for school use. This previous study was one of the first evaluation projects to be conducted and helped to establish guidelines and standards for this new field; however, two major criticisms had been noted: 1) it lacked a practicing teacher as part of the evaluation team, and 2) learner-based information had not been collected to validate the findings.

In response to these criticisms both factors became significant considerations when developing the evaluation procedure reported in this paper. During recruitment of evaluators, care was taken to include practicing teachers from the surrounding urban and suburban areas. This became a mutually beneficial practice and provided excellent training to those teachers who were involved. They gained invaluable knowledge and expertise which they could bring back to their respective schools, while the project gained a practical and applied orientation to evaluation. Often times it was the teacher who provided the necessary insight into a program by merely saying, "This is the type of program my kids would love and I could easily use it in my classroom." At that point, no matter how much dissent or disagreement existed about a particular program, the evaluators had to drop their theoretical constructs and intellectual pride and just listen. If a "boring, traditional drill and practice program" was found to be of value to a 5th grade New York City public school teacher, who could argue that the program was worthless? This type of input was necessary as it brought many issues into perspective.

Training of evaluators consisted of handing them the form, giving them a brief explanation of the important concepts and terminology such as "feedback," "branching," or "user control," and then having them evaluate a short simple software program using the form. As Project Director I would then read it over, mark down any comments I had, and meet with each evaluator individually. At this point the evaluator normally had many questions and needed clarification on various issues. When I felt each evaluator was competent and knowledgeable about the aspects of microcomputer software, he or she became part of an evaluation team and was assigned a program to evaluate.

During orientation each evaluator had been instructed to write down his or her background, area of expertise, and type of programs each would like to evaluate. This information became the basis for deciding who was to be included in each evaluation team. Every courseware package was evaluated by a team which included a subject matter expert, an instructional designer (or educational psychologist) who was knowledgeable about microcomputer software, a practicing teacher, and myself, the Project Director. There were usually many such teams functioning at once and when a courseware package was completed, an evaluator would be assigned to a new team which was to evaluate another program.

This type of teamwork was found to be very beneficial and contributed toward a healthy, well-rounded evaluation. It is highly recommended that a small team consisting of evaluators from these four different backgrounds be used in evaluation projects. The three core evaluators -- the subject matter expert, the instructional designer, and the teacher -- would individually evaluate each program in great depth and write up a detailed report. As the Project Director, I would look at each program long enough to become familiar with it and I would jot down detailed notes about its benefits and its flaws. I maintained the consistency throughout each team and contributed a knowledgeable background and guiding force throughout the project.

After all four team members had evaluated the courseware package a debriefing session was held. This session became the arena where all four personalities could meet to discuss, confront, and argue. It was my job as Project Director to try to compile a final report based on the four differing opinions. If no consensus could be reached, this was noted in the report. Again, the teacher was found to be invaluable by offering insights and opinions about issues the other three could only guess at.

The last phase in the evaluation process was gathering learner-based information. Once the debriefing sessions were completed, the evaluators were asked if they knew any students who were the age or level that the product was designed for. If so, they were requested to bring them in. With this pool of students (which was fairly large because of the teachers) plus those students who attended Teacher's College in special programs, each courseware program was tried out with a learner, and data were systematically collected using a form (see Appendix). This phase often turned out to be the most fun, the most interesting, and the most informative. We always tried to validate our assumptions by purposely choosing a particular type of student or specific part of a program to try out. Therefore, the evaluators would usually have definite questions in mind before the actual tryout. For example, one program we evaluated specified its target audience to include four year olds. During the debriefing sessions, evaluators felt strongly that the program was not appropriate for the average four year old. We therefore tried the program out with three different four year olds and our assumptions were verified. In addition, we could also recommend how the program might be adapted to include this age range. In a similar fashion, evaluators found one program to be very confusing in how it taught multiplication skills. We brought in two sixteen year olds who shortly confirmed our assumptions.

During the learner try-out, evaluators tried not to interfere with the students' session on the microcomputer, their role being that of unobtrusive observers collecting data. After each session, which lasted from a half hour to an hour, the evaluator would question the student using the form as a guideline. If necessary, specific questions about particular aspects of the program were also asked, i.e. were the graphics distracting, could you read the screen all the time, did you like to read stories on a screen? These responses were recorded and later used in the reports.

As a final step, the Project Director was required to take all of this information -- the three evaluators' forms and the learner-feedback forms -- and write up a composite report about the product.

This report was then presented to the E.P.I.E. editor who in turn transformed it into a final copy. Evaluators always received this final copy for revisions and comments before it went to the publisher.

This evaluation procedure was found to be very helpful in establishing a well-rounded report. It is a procedure that school districts could easily implement and it would help to increase their assurance that they are buying quality courseware programs specifically suited to their individual needs.

The following results can be noted regarding the instructional software programs evaluated in this project. These results are based upon the final report that was compiled using the evaluators' forms and the learner-based information.

Results

Table 1 represents a breakdown of the results by each criterion item found on the form used in this project. From this table it is possible to determine how many programs attended to specific design considerations. It must be noted that the total number of courseware programs included for analysis in this report is 29 and all percentages are based upon this N. This percentage does not reflect the total market but only what was evaluated in this project in the year of 1982.

TABLE 1

BREAKDOWN OF RESULTS BY ITEM

CRITERIA ITEM	%	N
1. Subject Area		
Spelling	7	2
Language	7	2
Social Studies	7	2
Science	3.5	1
Reading	17	5
Math	41	12
Logic/Problem Solving	17	5
2. Curriculum Role		
Supplemental	89.6	26
Basic Course	10.6	3
3. Mode of Interaction*		
Drill and Practice	62	17
Tutorial	24	7
Game	45	13
Simulation	10	3
4. Grouping*		
Individual	89	20
Pairs	20.6	6
Small Groups	13	4
Network	7	2

INTENTS		
5. Intended Users		
Not Specified	34	10
Specified	66	19
6. Target Audience*		
K-8	72	21
J.H.	24	7
H.S.	13	4
7. Objectives		
Inferred	66	19
Stated Clearly	34	10
8. Major Emphasis of Objectives		
Recall	62	18
Problem Solving	24	7
Concept Development	14	4
9. Field Testing		
Evidence reported clearly	3	1
None stated	97	28

*These categories were not all-inclusive and an evaluator could check as many as applied. Therefore % will not equal 100% and N will not equal 29.

CRITERIA ITEM	High		Middle		Low	
	%	N	%	N	%	N
CONTENTS						
10 Appropriate match of content to student ability	31	9	66	19	3	1
11. Program scope reasonable	45	13	48	14	6	2
12. Appropriate readability	28	8	55	16	10	3
13. Graphics used appropriately	38	11	24	7	17	5
14. Program free of errors	66	19	34	10	-	-
15. Directions clear	34	10	55	16	10	3
16. Display is clear (frame formatting)	59	17	41	12	-	-
17. Use of examples, demonstrations	31	9	28	8	41	11
METHODS						
18. Approach appropriate for intended users	41	12	52	15	6	2
19. Approach enhances presentation	48	14	38	11	14	4
20. Teacher's Guide: suggestions valuable	6	2	34	10	60	17
21. Teacher's Guide: integrates program in the basic curriculum	14	4	6	2	80	23
22. Teacher's Guide: technical explantions clear and complete	48	14	31	9	20	6
23. User Control:						
Use of content menus	83	24	-	-	17	5
Review instructions	34	10	-	-	66	19
Exit at any time	66	19	-	-	34	10
Alter rate of presentation	14	4	-	-	86	25
HELP options available	3	1	-	-	97	28
24. Feedback:						
Is non-threatening	86	25	7	2	7	2
Remediates	3	1	31	9	66	19
Is immediate	83	24	3	1	14	4
25. Audio enhances the program	17	5	7	2	7	2
26. Program is easy to use	48	14	48	14	3	1
EVALUATION						
27. Overall placement is provided	14	4	-	-	86	25
28. Pretests provided	7	2	-	-	93	27
29. Unit/Mastery tests provided	24	7	-	-	76	22
30. Printed tests provided	6	2	-	-	94	27
31. Program branches for review	14	4	-	-	86	25
32. Program branches after a lesson	-	-	-	-	100	29
33. Program provides computerized management system	24	7	-	-	76	22
34. Management system is valuable	29	2	71	5	-	-
35. Management system is easy to use	43	3	57	4	-	-

The following conclusions can be drawn from the data analyzed in Table 1:

- A majority of the programs available on the market are arithmetic programs;
- Most programs are a drill and practice application and are almost exclusively (90%) used for supplementary use in the classroom;
- Most programs (89%) are designed for individual use at the computer; 20% of the programs are designed to be used for pairs of students working together at the computer, 13% are designed for small groups, and only 7% could be used in a classroom network;
- The majority of the programs are targeted for elementary through junior high school (K-8) students;
- The major emphasis of the objectives is recall;
- Only one of the programs provide any hard data to substantiate field testing claims. 97% of the programs do not mention anything about field testing. A few programs allude to developing the materials by trying them out with students and teachers but no evidence is reported;
- Most of the programs' match of content to student ability is adequate;
- 55% of the programs' directions for the student are not clear enough to warrant a high score; 10% of the programs' directions are rated low because of confusion and inadequate explanation; 34% of the programs have excellent directions;
- Most of the programs do not use enough examples or demonstrations to help facilitate the instruction;
- Most of the programs' approach to the content is appropriate for the intended users and this approach enhances the presentation;

- Only 6% of the programs contain instructional suggestions in the accompanying Teacher's Guide that are seen to be valuable, while 60% of the programs are seen to be inadequate in this area;

- Only 14% of the Teacher's Guides contain any information on how to integrate the program into the basic curriculum, while 80% of the programs do not even address this issue or do so in such a sketchy manner that it is seen as virtually useless;

- While not really addressing instructional or pedagogical concerns, most Teacher's Guides do contain adequate technical explanations on how to operate the microcomputer and run the software program;

- With regard to user control, most of the programs (83%) use some form of content menus to direct the user through the content; 34% of the programs allow the user to review instructions, while 66% of the programs allow the user to exit the program at any time. Only 14% of the programs allow the user to alter the rate of presentation and only 3% of the programs contain a HELP option for those students having difficulty;

- Feedback is non-threatening in 86% of the progams and is given immediately after a response in 83% of the programs. However, only 3% of the programs provide any feedback which actually remediates the learner's response;

- Only 17% of the programs use audio which enhances the program; 52% of the programs do not utilize audio at all and 24% of the programs use it poorly, distracting and annnoying the user or those who are nearby;

- Most of the programs are easy to use with only 3% being rated low due to extreme difficulty in utilizing them;

° With regards to evaluation, the following results can be reported:

- -- Only 14% of the programs provide overall placement texts to facilitate placing students into the curriculum;
- -- Only 7% provide pretests;
- -- 24% of the programs provide unit or mastery tests after a sequence of instruction;
- -- Only 6% of the programs provide printed tests to supplement or replace computerized testing;
- -- 14% of the programs actually branch for review after a student enters a certain number of wrong responses. None of the programs branch after a lesson based upon results of student performance;
- -- Only 7 programs (24%) provide a computerized management system to track student progress and report the results to the teacher;
- -- Of these 7 programs which provide a management system, only 2 were found to be extremely valuable and only 3 were found to be very easy to use.

How Far have We Come?

What do the above results mean when trying to assess the overall market of instructional software for the microcomputer? How can it all be put into perspective to make some sense? Perhaps the best way is to compare these results to a similar study that was done in 1981 (Blum Cohen) to highlight how the market has changed.

1) First of all, the most evident change in the market from 1981 to 1982 is the overwhelming amount of courseware packages to emerge. In 1981 a handful of publishers decided to try the market out and produced a few instructional software packages. Most of the initial impetus in the instructional software market came from cottage industry and lone programmers who wanted to make a quick dollar. This is no longer true. Most of the major educational publishing companies which have traditionally produced instructional materials are now involved (or about to be involved) in producing courseware. Furthermore, many of the cottage industries are no longer so small and inexperienced. Many have greatly increased their volume of sales and now produce a large variety of programs to sell. This has resulted in an enormous amount of software packages which have flooded the market. There is no longer any shortage of courseware programs for educators to select from. Rather, the problem now lies in trying to determine what is quality software and how to evaluate and select software from the myriad of packages that exist.

2) The second most evident change is directly related to the first. Because of the greater amount of software that has emerged on the market, there is also a greater variety of subject areas that educators can choose from. In 1981 95% of the programs were arithmetic packages, while out of the 29 programs sampled in this study, 12 of them (45%) are arithmetic. 17% of the programs were reading, which showed a significant increase over the previous year. Surprisingly the teaching of logic was highly represented and this was due predominately to one specific company which is producing high quality programs that teach logical problem-solving skills. Still fairly underrepresented were science, social studies, and language arts programs.

3) The curriculum role of the programs is still predominately supplemental and the majority of programs are still a drill and practice application. This has not changed since 1981 although there is a greater variety of tutorials, games and simulations on the market.

4) Most of the programs are still designed to be used in the elementary to junior high school (K-8). However, there is a greater choice in the higher

grades although many more programs need to be developed to accommodate the high school market.

5) Although the major emphasis of the objectives is still recall, more programs are attempting to teach problem-solving skills and concept development. Much of this effort is seen in one or two companies which are trying to design programs that challenge students and teach logic as opposed to seeing this improvement cut across the market to all producers.

6) In general, the graphic capability of software programs has greatly improved. There are many more programs out on the market which utilize colorful, exciting graphics that are embedded in the content. However, there are still many programs which do not use graphics at all and present the information in purely text format. Other programs use graphics poorly and could greatly improve their graphic capability.

7) The Teacher's Guides are still notoriously inadequate in most instances and no improvement is seen in their addressing pedagogics.

8) There seems to be a bit more user control granted to the learner. Content menus and exiting the programs at any time are the two most frequent devices used. Students are still not able to review instructions in most programs, alter the rate of presentation, or call on a HELP function.

9) Feedback responses still do not remediate the wrong answers although most programs seem to be using feedback more appropriately.

10) Surprisingly, there has been little technological advancement in designing programs with a computerized management system. Only 7 out of the 29 programs provided a management system and they seemed no more elegant, sophisticated or advanced than the first programs that appeared on the market. Few programs have cumulative records that are stored on a magnetic device for future retrieval and none of the programs branched a student to a lesson based upon performance.

Where Should We Be Heading?

From the above data the most glaring development in the market seems to be the enormous amount of instructional software packages that has innundated the field. With this greater amount of programs to choose from, there is an understandably greater selection of software programs in the different subject areas, for different target audiences, to suit different roles and to satisfy differing modes of interaction. However, the actual technological capabilities of these programs do not seem to be any more advanced nor does the actual instructional design seem to be any more improved than the first products that appeared in 1981. Instructional strategies are still not being incorporated into the design in a systematic fashion and certain capabilities seem to be rarely employed.

Admittedly with all of these new products emerging, there are some producers who are exploring how this technology can be utilized and are developing high quality programs. In general, there seems to be a much greater awareness of what the microcomputer is and how it can be used for instructional purposes. The whole notion of feedback, user control, non-linear format of content and record-keeping devices are not such foreign terms anymore. However, whether these attributes are actually being utilized effectively in courseware is another matter.

The following recommendations will try to address many of the issues previously discussed here. They are made in hopes that producers of instructional software will attend to them so that the market will reflect not only a higher quality product but also one that is advancing toward its full potential.

1) There need to be more programs in such subject areas as science, social studies, and language arts. These programs should be designed for students in middle school and especially high school where there is still a great lack of

courseware packages.

2) Different modes of interacting with the computer other than drill and practice should be explored. Good tutorials which offer individualized instruction need to be developed. Simulations and gaming should be utilized more frequently.

3) Programs which are designed to be used by pairs or small groups of students working together need to be developed. The computer is particularly well-suited for social engagement and this type of instruction could greatly benefit classrooms.

4) There is still a great demand for those programs which teach critical thinking skills, problem-solving techniques and concept development. A few programs have emerged which are designed to do this. Such an attempt should cut across the market so that all producers are emphasizing higher-order skills in their instructional design and not just mere recall of previously learned facts.

5) More sophisticated use of graphics is still needed so that the concepts taught are visually reinforced. Graphics could become an integral part of the content and be used as a motivational device.

6) There needs to be a much more effective use of examples and demonstrations. This instructional strategy is definitely lacking in most courseware. When used, examples and demonstrations help to teach concepts and reinforce appropriate responses. Unfortunately, they are rarely used in courseware programs.

7) The Teacher's Guide needs to be improved and carefully thought out. It should contain:

- -- Specification of the rationale, goals and especially behavioral objectives;

-- A clear and concise statement of who the target audience is or who the program is designed for;

-- What entry competencies are required for successful use of the program;

-- Clear, concise and well-organized technical explanations on how to implement the program. This includes very detailed information on how to access and use the management system, if it is part of the program;

-- Instructional suggestions and strategies for using the program in a classroom;

-- Specific instructional activities to integrate the program into the curriculum;

-- A scope and sequence chart for use with larger curriculum courseware packages;

-- Field testing results or any documentation on learner verification studies in schools;

-- Placement provisions on how to place students into the program;

-- Supplemental activities and worksheets which can be used by students to help augment actual time spent on the computer.

8) Much more user control should be integrated into the instructional design of courseware programs. Students should have the chance to review instructions if needed, to exit the program at any time, to alter the rate of presentation and to call on HELP options.

9) Feedback should remediate students' wrong responses. By this it is meant that an alternate method of presenting the material should be employed after a

student answers the problem incorrectly. Presenting the same instructional sequence again is not remediation, just review.

10) Why not utilize the audio component so it enhances the program? Audio could reinforce correct or incorrect responses. Care should be taken that there is a built-in option to turn this feature off when used in a classroom setting.

11) Placement tests and/or placement provisions should be provided in all programs. This would greatly facilitate ease of use for the teacher.

12) Testing should be incorporated into the design of a courseware program after each unit of instruction. Criterion scores should be based upon a fair representation of sample items; i.e. failure should be based not upon getting 3 out of 4 wrong but rather 7 out of 10 wrong.

13) Actual branching is rarely employed in courseware programs. True branching occurs when the program offers different instructional sequences as that a student is automatically placed into based upon level of performance. A student can then pursue his/her own level of instruction without ever being aware any branching is taking place.

Providing a "loop back" to a previous sequence for review is not true branching; nor is it branching when the program automatically places a student into the correct lesson each time she/he signs on. This capability is one of the greatest benefits of the computer and needs to be utilized in many more programs.

14) More programs should utilize computerized management systems in their design. These management systems should be easy to use, contain informative cumulative records on student progress for teachers to access, and pinpoint student deficiencies.

Summary

The need to evaluate microcomputer software is paramount given the proliferation of microcomputers in today's schools and the state of flux and change in the software market. Schools, consumers and producers need this type of information to help give direction to this new field and put it into perspective. The dissemination of the evaluations, as well as reports about the project, is crucial so that other agencies may pursue similar projects.

An important aspect of the evaluation is that the reviews reflect valid information. The project reported in this paper is unique in that it is one of the first evaluations to incorporate a practicing teacher as part of the team of evaluators, and to gather learner-based information on each program to validate findings. This project was an attempt to take a step forward in evaluation by making it more responsive to learners' and consumers' needs.

It is hoped that school districts will use much of this information to develop their own evaluation projects. It is also hoped that this paper will help producers of instructional software to become more aware of the market and the direction it should be heading thereby creating a higher quality product.

References

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Heck, W.P., Johnson, J. and Knasky, R. Guidelines for Evaluating Computerized Instructional Materials. Reston, Virginia: National Council of Teachers of Mathematics, 1981.

Microcomputer Software and Information for Teachers (Micro SIFT). Evaluator's Guide. Portland, Oregon: Northwest Regional Educational Laboratory, 1981.

Roblyer, M.D. When is it "Good Courseware"? Problems in developing standards for microcomputer courseware. Educational Technology, October 1981, 47-54.

APPENDIX

Student Name: ____________________

Courseware Program: ________________

Grade: ____________________________

Section/Level Used: ________________

Age: ______________________________

Date: ______________________________

STUDENT OBSERVATION OF MICROCOMPUTER COURSEWARE USE

I. Physical Environment Information

Describe physical layout of the classroom including: where the computers are located; where the students are seated; and where the teacher(s) is (are) located. Use the following symbols:

$\boxed{C}$ = Computer ☐ = Desks X = Student T = Teacher ☐ = Blackboard

Comments: ______________________

____

____

____

____

____

II. Ease of Use of Courseware Program

Student Checklist	Yes	Somewhat	No
1. Student has a problem manipulating the keyboard.	___	_______	___

Comments: ________________________________

____

Student Checklist	Yes	Somewhat	No
2. Program holds student attention.	___	_______	___

Comments: ________________________________

____

		Yes	Somewhat	No
3.	Student has a problem following program's directions.	___	_______	___

Comments: ______________________________

____

4.	Student is self-sufficient and is not asking teacher many questions after initial introduction.	___	_______	___

Comments: ______________________________

____

5.	Student has a problem reading the screen.	___	_______	___

Comments: ______________________________

____

IV. Student Questionnaire

1. Did you like this program? ____ Why or why not? __________________

____

2. Did you learn anything from it? ____ What did you learn (or why didn't you learn)? ____

____

3. Could you follow the instructions all the time? __________________

____

4. Would you want to use this program again? ____ Why or why not? ______

____

5. Did you like using the microcomputer? ____ Why or why not? _________

____

6. What did you think of the graphics/pictures (if there were any)? ______

____

7. Did you find the screen easy to read? ____________________________

____

III. Teacher Questionnaire

1. What type of student is this? ________________________________

2. Does he/she do well in __________ subject area? ______________

3. What are his/her strengths? ________________________________

Weaknesses? ____

STATE APPROACHES: THE TEXAS MODEL

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COORDINATOR FOR COMPUTER-BASED INSTRUCTION
REGION IV EDUCATION SERVICE CENTER
HOUSTON, TEXAS

Software Evaluation: Support Through the Texas Education Computer Cooperative (TECC) Project

The TABS Related Courseware for Microcomputers Project, funded by the Texas Education Computer Cooperative (TECC), was designed to increase the effective use of microcomputers, especially as they assist instruction relating to the Texas Assessment of Basic Skills (TABS) objectives for reading and/or mathematics for grades 3, 5, and 9.

The Project Advisory Committee was comprised of one representative from each of the twenty Education Service Centers in Texas. Evaluative criteria and procedures were identified. Region IV Education Service Center coordinated training for the twenty representatives, who in turn conducted training in evaluation techniques for approximately two hundred teachers across the State. These teachers were then responsible for the evaluation of each courseware package submitted.

Courseware designed for the Apple, Commodore Pet, and Radio Shack TRS-80 microcomputers was evaluated, and both commercial and non-proprietary sources were included. Region IV Education Service Center invited vendors to participate in the project by providing courseware packages for evaluation, then collected, catalogued, and disseminated courseware and evaluation guides to each of the twenty Education Service Centers. Each courseware package was evaluated at two different sites for appropriate hardware, instructional design aspects, and correlation to specified skills. By August 1982, more than 200 courseware packages were reviewed.

At the completion of the evaluation period, all materials were returned to Region IV, where evaluations were tabulated and final results disseminated. The resulting product is the Evaluation Guide for TABS Related Courseware, and the database of those programs evaluated, both of which have distributed to the Education Service Centers for use by their school districts.

The second phase of the TECC Project, Statewide Microcomputer Courseware Evaluation Network, will expand its focus to include K-12 Reading/Language Arts, Mathematics, Business Education, Vocational Education, and Science. Evaluation will largely parallel that of the first phase, although special interest will be given to those courseware packages which include a management system or which are generic tool packages (i.e., word processing, data base management, and similar programs). To insure effective evaluations, courseware packages will be evaluated at three sites, and the evaluation form will see the inclusion of a student evaluation section. This phase of the project will be completed and the resulting evaluations available by September 1983.

Microcomputers enhance instruction only to the extent that appropriate courseware is available. The overall intent of the TECC Project is not to recommend specific hardware or software, but rather to serve as a tool in the school's decision-making process of previewing and procuring the appropriate software for instructional use.

EVALUATION GUIDE
FOR
TABS RELATED
COURSEWARE

REGION IV EDUCATION SERVICE CENTER
P.O. BOX 863
HOUSTON, TEXAS 77001

INTRODUCTION

The microcomputer revolution has caused a rapid growth in the availability of instructional materials for microcomputers. As a result, educators are being asked to purchase large amounts of computer materials with very little computer training. Some common questions asked are what types of computer materials are effective? How can you tell if the materials are effective? And how will this fit into our present curriculum? The answers to these and many other questions concerning computer materials are the subject of this evaluation guide.

The enclosed evaluation form is based upon the authors' experiences in software evaluation, upon work previously conducted with Scholastic Magazines, and upon a number of resources including MicroSIFT, the National Council of Teachers of Mathematics, EPIE, and CONDUIT. This particular form includes many of the categories listed in the above evaluation guides and offers an additional feature that allows the reviewer to obtain a quantitative "measure" of effectiveness. Considerable effort has been taken to make the form unambiguous and simple in design. The special feature of evaluating TABS related software has been accomplished by adding a separate section to a more "standard" form design. We have tried to create a document that is both easy to use and an effective evaluation instrument.

This evaluation guide is divided into five different parts. The first four parts address the specific aspects of the evaluation process. PART I deals with information that describes the computer materials such as the name, hardware requirements, and necessary peripherals. Most of this type of information can be obtained from the program's documentation.

PART II addresses the broad instructional strategies used to implement the specific content. Again, most of these items are described in user manuals that accompany the computer materials.

PART III allows the reviewer to relate the computer materials to specific TABS objectives. Each objective is listed on the evaluation form and serves as an easy reference for the reviewer.

PART IV allows the reviewer to rate the specific instructional and technical qualities of the program. Each of the items listed under this section is discussed at length in the subsequent pages of this guide. Part IV concludes the evaluation process and provides space for the reviewer to make comments about the product. The reviewer may wish to clarify some of the rating decisions or document their reasons for certain judgements.

PART V of this guide provides information on the quantitative measure available after a review has been completed. A discussion of the flexibility of review usage by a school district is included.

PART I -- IDENTIFICATION

Before the reviewer "runs" the individual package, descriptive information should be recorded. The first part of the evaluation form lists the various items that should be included in this description. Most, if not all, of this information can be obtained from the documentation or author's guide that accompanies the computer materials.

A. Package Name

List the name of the package. At this time indicate whether these computer materials consist of a single program or a series. If the reviewer is evaluating one or more programs that are from a series, then all the programs should be reviewed under the PACKAGE name.

B. Distributor

The reviewer should list the name, address, and telephone number of the company that sells the package.

C. Microcomputer

The reviewer needs to identify the hardware requirements for the package. The following items should be noted:

- Identify the brand name of the computer.
- If appropriate, identify the special operating system that is necessary to run the materials.
- Note the amount of memory required.
- Check whether the program requires any special programming language such as Integer BASIC or PASCAL. It is assumed that all systems include a standard BASIC programming capability.
- Check the other special equipment that may be needed to operate the package such as color, number of disk drives, etc.

PART II -- INSTRUCTION

Part II describes the instructional strategy used to implement the specific package content. Information on grade level, instructional technique, special activities, and characteristics should be noted. Such information, along with the approximate instructional time, is necessary.

A. Grade Level

Circle all appropriate grade levels in which the computer materials might be applicable. Even though the TABS objectives later refer to specific grade levels, most software packages provide materials appropriate for multiple grades.

B. Instructional Technique

A program can be one or a combination of two or more of the below instructional techniques. However, check only one that is most appropriate.

- Drill and Practice programs, as their name implies, develop skills or reinforce concepts previously presented. Drill and practice programs generally supplement regular classroom instruction and are characterized by a question/answer format. Very little new content material is included.

- Tutorials are designed to teach rules or concepts. Similar to programmed texts, they are characterized by the presentation of learning material to the student in various steps, followed by a question or test. Questions are usually followed by an evaluation of the student's response, reinforcement, and/or branching to another section of the instructional program.

- Computer Simulations consist of models or replications of one's environment. Simulations allow the student to interact with the model and provide learning experiences that might not otherwise be available because of factors such as cost or convenience.

- Problem Solving programs allow the student to use the computer as a tool to derive a set of rules or procedures that will lead to a solution of a problem. In fact, the development of these rules are the most important aspect of the technique. Problem solving often involves using the computer to perform calculations.

- Educational Games engage the student in a competitive activity that requires him or her to demonstrate mastery of a subject in order to win. The game or the competition is the means by which the student demonstrates mastery of a skill.

C. Instructional Activities

Under this category, the reviewer must determine whether usage of the package depends upon any outside materials or activities. The reviewer should check all items that are applicable.

- Classroom Text Dependent -- Determine whether the computer materials must be used with a classroom textbook. If this is true, then the item should be checked.

- Direct Teacher Supervision Required -- Note whether the computer activities require direct teacher supervision or the presence of a monitor. This category is intended to address only those instances when direct supervision by a teacher or monitor is required.

- Student Workbook Required -- Check this item if a student workbook, printed handout, or supplementary material must accompany the computer materials. Optional workbooks do not apply.

D. Special Characteristics

In this category, the reviewer needs to focus on the flexibility of the computer materials. Circle the appropriate responses.

- Timed Environment -- Determine if the student has control over the rate of presentation of display. Also check whether the student or teacher can control the time allowed for the solution of the problems. If there are ANY timed features in the package, then a Y should be circled.

- Student Branching Allowed -- Consider whether the materials allow the student to select his or her own sequence through the content. Another form of student branching is a pre-test that begins the student at the appropriate entry level or a branching sequence that remediates problem areas.

- Material Modification Allowed -- Determine whether the teacher or monitor can alter any part of the computer materials. Such modification might include varying questions, answers, number of questions, etc.

- Student Statistics Provided -- Note whether the teacher can obtain information regarding individual student performance. Student statistics might include individual test scores, means, item difficulty, etc.

- Distracting Sound -- Determine whether the sound would disturb others in a classroom environment. If the teacher/student is provided an option of either using or not using the sound, then circle N.

E. Approximate Student Instruction Time

- Lesson -- Estimate the amount of time that it takes an average student to complete one lesson or one student/computer interaction, e.g., 15 minutes.

- Package -- Estimate the amount of time that it takes an average student to complete the entire package. If there is only one program in the package, then the two time figures will be the same.

PART III -- TABS INFORMATION

A. Select the content area in which the computer materials can be used.

B. Select the appropriate level of the computer materials. Although the computer package might be appropriate for first or second grade students, one would identify the third grade TABS level. Only one level should be addressed in one evaluation. If a package has materials suitable for two TABS levels, for instance third and fifth, two evaluation forms should be filled out.

C. Identify all TABS objectives that are successfully addressed in the computer package. The individual objectives are listed for easy reference.

PART IV -- EVALUATION

Information in Parts I - III of the form should not vary significantly from reviewer to reviewer. Such information, while extremely important, is not open for interpretation or evaluation. Part IV of the form, however, attempts to draw upon an individual evaluator's experiences and opinions relating to the package. Both the quality of the presentation and the content are to be evaluated.

Items one through ten are to be rated by the reviewer. The descriptions following are intended only as suggestions to be considered by the reviewer.

A. PRESENTATION

Ease of Use

- The package requires a minimal amount of equipment manipulation
- The package requires a minimal amount of software manipulation
- The instructions and error messages are clear and unambiguous
- The user support materials are clear and unambiguous
- The package does not require extensive support from teachers or monitors
- Useful examples are provided for package use

- Help pages are provided

- Menus are utilized for program control

Reliability

- The package will consistently load into the computer without undue assistance

- The package will consistently run under all normal conditions

- The package will consistently run if unexpected input is provided

- The package is free of programming and operational errors

Motivation

- A student is left with a desire to use the package again

- A student is left with a positive attitude about computer learning activities

- The package demonstrates a creative use of the computer

- The package challenges the student and provides a new way of acquiring knowledge

Frame Display

- Good message design principles are used throughout the package

- Graphics, sound, and color focus the student's attention rather than detract
- Text is effectively displayed and well-spaced on screen
- Formats are consistent
- Displays are not repetitive or slow

Documentation

- The objectives of the package are clearly stated
- There is sufficient student/teacher printed information to use the package
- There is adequate user support materials
- There is enough screen-displayed documentation to understand usage
- The directions within the program are clear and accompanied by useful examples

B. CONTENT

Accuracy of Content

- The information and instructional approach are accurate
- There are no factual errors
- The graphs, displays, and statistics are accurate

- The printed material is thoroughly edited and free of grammar and spelling mistakes

Appropriate Feedback

- Feedback gives relevant and valuable information to student inputs
- Feedback for wrong answers is not so entertaining that wrong answer responses are reinforced
- Feedback is non-threatening
- Feedback is not repetitive or boring
- The computer responds to natural student inputs
- Feedback aids in correcting responses rather than simply notifying student of error
- Feedback style is appropriate for targeted user group

Appropriate Level of Difficulty

- The readability of the program is consistent with user population
- The instruction is suitable for the user population
- The instruction accounts for individual differences and allows remediation
- The instruction adjusts to individual learning styles
- The package allows the student to make individual decisions

Appropriate for Computer Use

- The application is well suited for computer use and could not be done more effectively using some other media
- Course management and data collection are available
- The computer is used in a dynamic way
- The package makes the students become actively involved

High Educational Standards

- The content and objectives are pertinent to regular school curriculum
- The package addresses useful skills
- The content is free of ethnic or racial bias
- The content does not glorify violence

C. COMMENTS TO DISTRIBUTORS

At this point the reviewer is allowed to make comments relating the package. Items which the reviewer may wish to clarify would be those areas in which poor ratings were recorded. The reviewer may also make any recommendations for package improvement. Such comments would be made available to the vendor for consideration.

STATE APPROACHES: THE FLORIDA MODEL

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TALLAHASSEE, FLORIDA

The following material supplements the teleconference presentation by Pristen Bird, who spoke with conference participants for over an hour on approaches to evaluation of educational software in Florida.

EDUCATIONAL TECHNOLOGY SECTION
Florida Department of Education
109 Knott Building
Tallahassee, Florida 32301
(904) 488-0980

The Educational Technology Section (ETS) plans and coordinates Florida's use of technology to improve education. Formerly the Florida Educational Computing Project, ETS supports efforts by school districts, community colleges, universities and the Department in the following areas:

- instructional computing
- administrative computing

Instructional computing involves the use of computers with students and instructors in public education. Students use microcomputers or terminals to learn programming, to review basic skills or receive tutoring in new material. Teachers use computers to manage instructional learning.

Administrative computing involves using micros or main frame computers to support administrative activities. Necessary record keeping such as budgeting, payroll and attendance is streamlined.

Our services, which include consulting by phone, by mail and in person, relate to both instructional and administrative computing. They are described below.

1. Microcomputer Contract. A contract to purchase microcomputer systems from approved vendors in 28 regions of the state will be in effect in August 1982. These contracts will alleviate the need for local bidding.

2. Discount Agreements. The negotiation of discount agreements between computer vendors and public districts or institutions has resulted in savings of approximately $800,000 during the past four years.

3. Technical Assistance. Schools and institutions can receive various services: assessment of computer needs, development and evaluation of proposals and assistance with management information systems.

4. Hardware/Software Approvals. The Florida Legislature requires Commissioner approval for hardware and software purchases over $6,000 within a 12-month period. These reviews for approval increase the coordination and compatibility of equipment and materials, plus reassure institutions about their acquisitions. ETS reviews acquisition requests and makes final recommendations to the Commissioner.

5. Sharing of Computing Resources. ETS encourages the sharing of software, hardware and personnel resources among public educational agencies and, where feasible, local governmental agencies. We work with the Divisions of Public Schools, Special Programs, Community Colleges and the State University System.

6. Information Dissemination. ETS provides information about state policy on educational computing discounts and courseware evaluations. This information is distributed through our newsletter, Ed Tech NEWS, and at computing consortia meetings.

INSTRUCTIONAL COMPUTING

Three specific goals to support instructional computing include: assisting local personnel, encouraging innovative uses of computers, and advancing computer literacy.

1. Assistance to local personnel. ETS helps answer common questions like, "Who's doing what with computers, kindergarten through university?" A support network is planned which will include personnel knowledgeable in instructional computing.

The Florida Center for Institutional Computing (FCIC), funded by the Department in 1981, is located at the University of South Florida in Tampa. The objective of FCIC is to assist educators in the state. FCIC indexes and evaluates courseware, provides a micro lab for educators and students. A survey of the instructional uses of computers will be conducted annually.

2. Creative uses of computing by teachers and students. The Department encourages sharing of innovative computing uses through state, regional and local activities. This includes the annual Florida Institutional Computing Conference (March 29-30, 1983, Tampa), the Microcomputer Contest for High School Students (Spring '83, Tampa), and computer fairs.

3. Computer literacy. Trained leaders from various districts or institutions offer a computer literacy seminar designed by the Department through local Teacher Education Centers.

ADMINISTRATIVE COMPUTING

Automated Reporting. ETS supports improving automated reporting. Such reporting of required data provides an opportunity to reduce the burden on educators. Data are submitted directly to the DOE rather than reporting on paper. Data are used more efficiently; reporting is streamlined. Examples of automated reporting efforts include the Florida Information Resource Network (FIRN), the FTE Pupil Count and Vocational Education Data on Occupational Students (VEDOS).

Networking. Some school districts have formed consortium to share computing resources. This consortium concept enables several districts to use the resources, hardware and software, of a centralized site. An important function of ETS is to support the networking efforts of public education including FIRN.

For further information, contact:

David Brittain, Director
Malcolm Barnes, Systems Development Coordinator
Pristen Bird, Instructional Computing Consultant
Dianne Cothran, Research Assistant, Newsletter Editor
Francis Watson, Automated Reporting Consultant
Julie Butler, Secretary
Gail Grissett, Secretary

STATE APPROACHES: THE CALIFORNIA MODEL

BRUCE HAGEN
CONSULTANT, OFFICE OF STAFF DEVELOPMENT
CALIFORNIA DEPARTMENT OF EDUCATION
SACRAMENTO, CALIFORNIA

The following material supplements the teleconference presentation by Bruce Hagen, who spoke with conference participants for over an hour on approaches to evaluation of educational software in California.

I. OVERVIEW OF TEACHER EDUCATION AND COMPUTER (TEC) CENTER PROGRAM

A. Program Description

The Investment in People program sets up fifteen (15) regional Teacher Education and Computer (TEC) Centers, which together provide statewide coverage. Each TEC Center will help schools put together staff development plans and help them meet their training needs. TEC Centers will provide for training in three (3) areas: teaching methodology, resource brokerage and capacity building, and computer use.

The TEC Centers consolidate successful staff development programs which have been offered in limited areas by School Resource Centers and Professional Development and Program Improvement Centers, and will be absorbing the resources developed in these earlier programs.

II. TEACHER EDUCATION AND COMPUTER (TEC) CENTER RESPONSIBILITIES

The primary purpose of the regional TEC Centers is to provide for staff development in the following three areas:

A. Teaching methodology

B. Resource brokerage and capacity building

C. Computer use

The TEC Centers shall provide for staff development activities in all areas of the curriculum, but approximately sixty percent (60%) of the centers' funds must be spent for activities to improve skills in mathematics, science, and/or the use of computers.

The TEC Centers will set up an outreach process which will bring business and industry in their region into an interactive role in staff development efforts. This two-way contact will identify what business and industry resources can do to assist in staff development and other school improvement efforts. This linkage will also help establish clear expectations of the skills and competencies that are required of students for employment in business and industry.

OFFICE OF STATE DEVELOPMENT

Emanuel J. Scrofani, Director
721 Capitol Mall
Sacramento, CA 95814
(916) 322-5588

TEACHER EDUCATION AND COMPUTER (TEC) CENTERS

1982-83

Region/County Office	Address	Interim Director(s)	Telephone Number
1. Humboldt	901 Myrtle Eureka, CA 95501	* Jan Coates	(707) 445-5411 ext. 266
2. Tehama	P.O. Box 810 Red Bluff, CA 96080	* Marilyn Niepoth	(916) 527-5811 ext. 29
3. Marin	1111 Las Gallinas Ave. San Rafael, CA 94903	* Carol Cooper	(415) 499-5877
4. Sacramento	9738 Lincoln Village Sacramento, CA 95827	* Charles Matus	(916) 363-6758
5. San Francisco	2550- 25th Avenue San Francisco, CA 94116	* Marcia Hunt	(415) 731-6616
6. Alameda/ Contra Costa	685 "A" Street Hayward, CA 94541	* Kay Pacheco Linda Webster	(415) 881-6196 881-6234
7. Stanislaus	801 County Center Three Modesto, CA 95355	Nanette Green Ron Witort	(209) 944-3169 (209) 571-6605
8. Santa Clara	100 Skyport Drive San Jose, CA 95115	* Shareen Young	(408) 947-6992
9. Ventura	535 E. Main Street Ventura, CA 93009	* Steve Kingsford	(805) 654-2164
10. Kings	County Government Center Hanford, CA 93230	Marvin Sohns	(209) 584-1441 ext. 2935
11. Kern	5801 Sundale Avenue Bakersfield, CA 93309	* Nancy Comstock	(805) 398-3641
12. Los Angeles	9300 E. Imperial Highway Downey, CA 90242	* Lynn Arkan	(213) 922-6684
13. Riverside	3939- 13th Street Riverside, CA 92502	* Karen Davis	(714) 788-6684

Region/County Office	Address	Interim Director(s)	Telephone Number
14. Orange	County Operations Center Building "B" 1300 S. Grand Avenue Santa Ana, CA 92705	*Meredith Fellows	(714) 953-3713
15. San Diego	6401 Linda Vista Road San Diego, CA 92111	* Jack Hill	(619) 292-3883

* Permanent Director
12/21
pw

CALIFORNIA SOFTWARE CLEARINGHOUSE

The Teacher Education and Computer (TEC) Center program divides California into 15 regions, each with a TEC Center responsible for providing inservice to teachers in the fields of science, mathematics, computer literacy, and other subject areas. The Microcomputer Center in the San Mateo County Office of Education has been designated the statewide Software Library and Clearinghouse for the TEC Centers.

The Clearinghouse will have four major responsibilities:

1) to develop a cadre of software evaluation specialists who will train teachers in their regions as software evaluators;

2) to construct a subject area/grade level PREVIEW GUIDE of highly recommended software;

3) to provide rotating collections of software for preview and evaluation at each TEC Center; and

4) to collect and disseminate critical evaluations of instructional software.

Successful completion of these four responsibilities will expand the base of trained evaluators throughout California, help them to identify the best currently available software, and also provide new software for preview.

A Software Evaluation Forum was held in San Mateo County in January 1983, for the purpose of developing the cadre of software evaluation specialists and establishing the advisory list of highly recommended software. Two representatives from each TEC Center Region and representatives from successful software evaluation projects at state and regional levels throughout the United States were invited to participate. Educators helped to establish the advisory list and also provided an added dimension to the work with the software specialists from the TEC Centers.

Other activities of the Clearinghouse will include the publication and dissemination of software reviews represented from the 15 TEC Centers, supporting the working of the California Library Media Consortium for Classroom Evaluation of Microcomputer Courseware, coordination of the development and distribution of SOFTSWAP public domain programs, contacts with software publishers, and investigation of the possible electronic dissemination of software evaluations and related information. A second, smaller Forum will be held in May 1983, to evaluate the work of the Clearinghouse during its first year and to plan activities for 1983-84. A publishers' display of new software will be scheduled in conjunction with the May Forum.

SCHOOL DISTRICT APPROACH: HOUSTON I.S.D.

PATRICIA STURDIVANT
ASSOCIATE SUPERINTENDENT
DEPARTMENT OF TECHNOLOGY
HOUSTON INDEPENDENT SCHOOL DISTRICT
HOUSTON, TEXAS

HOUSTON INDEPENDENT SCHOOL DISTRICT

COURSEWARE REVIEW PROCESS

I. BACKGROUND

The Urban Technology Consortium members (Houston, Albuquerque, Cincinnati, Detroit, Salt Lake City, and Boston School Districts) have entered into an agreement that provides for the mutual exchange of software reviews. Educational Products Information Exchange (EPIE) staff is responsible for training a group of evaluators in the use of a courseware evaluation procedure. Evaluators will review programs and submit them to the Department of Technology. EPIE will facilitate the exchange of reviews among the six districts. This information will assist school personnel in making decisions about software purchases.

II. REVIEW PROCESS

The Department of Technology coordinates the district-wide review of software. Commercially produced software is screened and reviewed on a regular basis. Software vendors are provided with an opportunity to present their latest products to the staff. These vendor sessions are conducted on the first and third Wednesdays of each month. Staff members study the software and make recommendations to the Courseware Review Committee. A Vendor Response Form is completed by the software vendor which identifies demographic data, costs, training, warranty, provisions for networking and support available. This form is used for negotiating quantity discounts. The Committee, appointed in April 1982, affirms recommendations for courseware procurement.

Central Administration:	Carol Kuykendall Madolyn Reed Sharon Williams

Area Support: Dan Ellison
Peggy Moller
Carol Selig

Department of Technology: Tom Boudrot
Patsy Rogers
Judy Peters, Facilitator

The EPIE Evaluation Form is used if no published reviews are available to assess technical and instructional quality.

The following criteria are used for evaluation of courseware:

- Technical quality
    - programming
    - structuring techniques
    - documentation
    - compatibility with existing hardware
    - availability of courseware in a format that will run on a network

- Content
    - correctness of content
    - matching learner ability
    - relevance

- Instructional quality
    - well-defined objectives that support curriculum
    - use of graphics
    - learner control

- Theory base
    - follows principles of learning
    - gains the student's attention
    - motivational
    - provides the learner with objectives
    - provides meaningful feedback
    - provides performance assessment

- Vendor support
    - quality of training provided
    - quantity discounts
    - local consultation
    - software warranty
    - back-up provisions

III. RESOURCE LIBRARY

The Software Resource Library at the Technology Center provides teachers and administrators with an opportunity to preview hardware and software before purchase. The Library has technology-related periodicals, books, software, pamphlets, directories, and hand-held learning devices. The MECC courseware is also available for duplication. Documentation is provided. All distribution of software to schools is handled through the Library.

The second and fourth Wednesday of each month is reserved for preview sessions by subject area. The calendar is published in the Technogram, the Department's newsletter. All software for the Department's competency-based training program is supplied from this Library.

The Software Resource Coordinator provides support to the training team. Information about software and other resources is routinely shared in various workshops.

IV. PROCEDURES FOR THE PURCHASE OF SOFTWARE

Software may be purchased if it is listed on the Approved Software List. The list of approved courseware is identified in the Implementation Manual or is available upon request. When courseware that is not on the approved list is requested, a Software Request Form must be completed and approved by the appropriate department head or principal. It is then sent to the Department of Technology.

A requisition is needed for any software not available for purchase from the Department of Technology. An External Budget Amendment is required in order to purchase discounted software available through the Department of Technology. When the information is provided and approved, courseware will be provided.

COURSEWARE EVALUATION WORKSHOP

Congratulations on being selected to participate in this Courseware Evaluation Workshop. After the two-day training sessions, you will evaluate two pieces of courseware using the courseware evaluation form developed by Educational Products Information Exchange (EPIE).

For each review that is accepted by EPIE, you will receive points which may be applied to software for your school. If you are not affiliated with a particular school, you may select software for a school of your chioce. The software may not be given to an individual -- it must be used in a school within the District.

Points will be assigned based on the size of the software package and the complexity of the material presented. The Software Resource Coordinator will keep a record of points earned. You will be notified when you have earned enough points for the package of your choice. You will be given the software and provided with appropriate training in its use. All packages on the list are for District-wide use.

Good luck in earning points for your school!

HOUSTON INDEPENDENT SCHOOL DISTRICT

VENDOR RESPONSE FORM

I. DEMOGRAPHIC DATA

PROGRAM NAME: ______________________________

GRADE LEVEL(S) ______________ SUBJECT AREA: __________

DISTRIBUTOR: ______________ AUTHOR: __________

ADDRESS: ______________________________

CONTACT PERSON: ______________ TELEPHONE: ( ) __________

HARDWARE REQUIREMENTS*: __________ DOS: ___3.2 ___3.3

OBJECTIVES OF PROGRAM:

INSTRUCTIONAL PREREQUISITES:

DESCRIPTION OF PROGRAM:

COMPONENTS: SPECIFY NUMBER OF DISKS, MANUALS AND SUPPORTIVE DOCUMENTATION.

* MOST OF THE COMPUTERS ARE APPLE II'S WITH 32 K OR 48 K AND HAVE SINGLE DISK DRIVES. HALF THE SYSTEMS HAVE 3.2 DOS BUT MAY BE UPGRADED IF NECESSARY.

II. COSTS: EXPLAIN DISCOUNT STRUCTURE FOR QUANTITY PURCHASES.

III. TRAINING: ATTACH TENTATIVE OUTLINE FOR TRAINING TO BE PROVIDED. REFER TO THE ENCLOSED CHART FOR THE ALLOCATED TIME. THERE WILL BE 30 PARTICIPANTS IN EACH TRAINING SESSION. SPECIFY WHO WILL CONDUCT TRAINING.

IV. SOFTWARE WARRANTY: EXPLAIN WHAT PROTECTIONS WILL BE PROVIDED IF THE SOFTWARE BECOMES DAMAGED THROUGH PROPER OR IMPROPER HANDLING. ALSO EXPLAIN CORRECTION PROCEDURES WHEN PROBLEMS ARE SOFTWARE RELATED.

V. SUPPORT AVAILABLE: DESCRIBE CONSULTANT SERVICES AVAILABLE FROM LOCAL VENDOR.

VI. PROVISIONS FOR NETWORKING: DESCRIBE HOW THE COURSEWARE CAN BE USED ON A NETWORK.

VII. COURSEWARE REVIEWS: ATTACH COPIES FROM COMPUTER JOURNALS OR EVALUATION AGENCIES, E.G., MICROSIFT, EPIE. NOTE SOURCES HERE.

VIII. DESCRIPTIVE LITERATURE AND DOCUMENTATION: INCLUDE THREE SETS OF BROCHURES AND MANUALS.

IX. FORMATS AVAILABLE: LIST THE COMPUTERS FOR WHICH THIS PROGRAM IS AVAILABLE (SPECIFY CONFIGURATION).

X. OTHER COMMENTS: PLEASE INCLUDE ANY CORRECTIONS OF DATA SUMMARIZED ON THE ENCLOSED CHART.

Submitted by: ____________________
Position: ____________________
Date: ____________________

G3-32.1

SOFTWARE REQUEST FORM*

NAME: ______________________ PRICE: ________

VENDOR: ______________________

ADDRESS: ______________________

DESCRIPTION: ______________________

If not on "approved" list, please attach a positive review from a published journal. Note the bibiliographic information:

SOURCE:

DATE:

*School personnel should make sure that the software does not require additional firmware or hardware. If these needs are identified, a regular Implementation Plan must be completed if the cost exceeds $200. Explain any upgrade that costs less than $200 in the space below:

DO NOT WRITE IN THIS SPACE

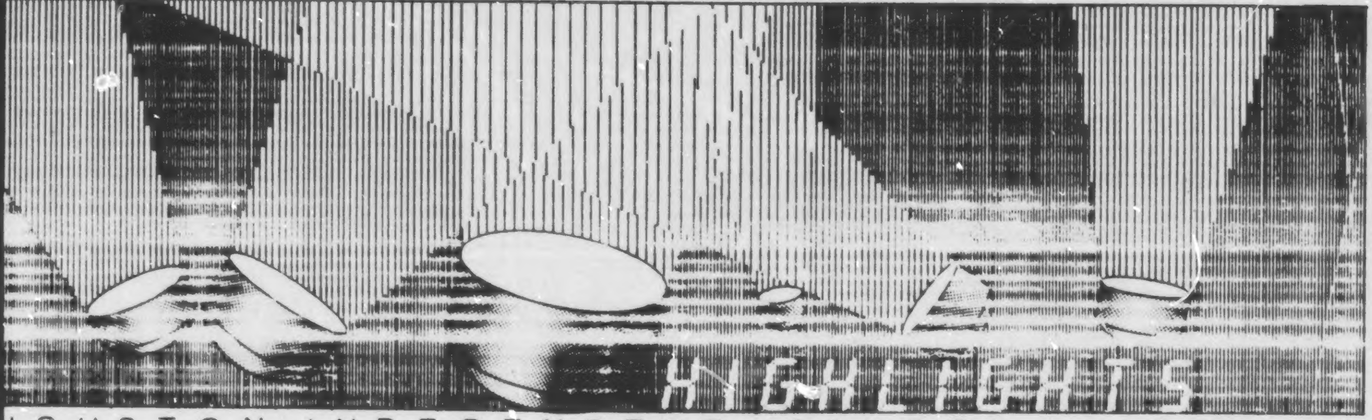
________	Date Received
________	Requisition or Budget Transfer Approved by DOT

SUBMITTED: ________

APPROVED: ________

DATE: ________

Department of Technology



HOUSTON INDEPENDENT SCHOOL DISTRICT

The computer age is upon us.

Sandwiched in between TV ads for deodorant and cat food are slick pitches for sophisticated home computers. Grocery store checkout lines now use computer-generated holograms to price a can of beans. Adolescents feed their quarters into dazzling video games made possible by microchip technology.

Is it all a fad? It is not. Americans have already bought a million home computers. American business has adopted the new technology to such an extent that it could not function without it. Why? Basically for two reasons: it's cheaper and it's more productive. Microchips are the seeds of the second industrial revolution. America must nurture those seeds or lose the technological edge that has made it prosper.

Educators have watched these developments with great interest. Some have realized that public education must adopt the new technology. Why? For the same two reasons: it's cheaper and it's more productive.

The cost of computers has dropped so much that they now hold the best hope for individualizing instruction without huge increases in staff. They are productive because they free teachers for the more important, humane aspects of teaching. Computers save students time for more meaningful learning, while exposing them to technological skills they will need the rest of their lives.

The Department of Technology was created to smooth the District's transition to the computer age. Listed below are its primary activities.

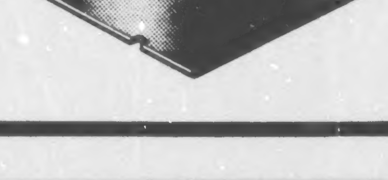
PLANNING

To organize the use of technology in the District, a *Technology Planning Document* was developed to specify staffing patterns, budgetary resources and implementation strategies. The document discusses the organizational and instructional issues that best can be addressed by technology. This type of ongoing strategic planning is necessary to coordinate efforts among the many departments and campuses of the District.

CENTRALIZED PROCUREMENT

Quantity purchases are made when possible to secure the best prices. All hardware and software is purchased centrally to assure coordination and compatibility.

Vendors present their wares to a Hardware Selection Committee and a District Courseware Committee for evaluation of potential applications. Comparative analyses and research help document the recommendations made to the administration and School Board.



DATA MANAGEMENT USERS COMMITTEE

Many applications of the computer are emerging as the demands for program accountability and data based decision making increase. A Users Committee, comprised of superintendents representing the major divisions of HISD, reviews information requirements and recommends programming priorities. The committee reviews expert opinion and makes recommendations for new projects. Its primary purpose is to reduce data redundancy by matching software and hardware (maxi, mini, or micro) to needs.

MICROCOMPUTER IMPLEMENTATION PLAN

An implementation plan must be completed and approved by the Department of Technology before any computer hardware or software may be purchased. This assures that programs include documentation, quality control, staff training, and equipment compatibility.

Specifically, the plan calls for a description of the program, the objectives, the target population, staffing requirements, training needs, hardware, software, equipment location and scheduling, funding requirements, and the reasons for using computers rather than a more traditional medium.

A *Manual for Writing a Microcomputer Implementation Plan* has been prepared to assist administrators. The manual's first section addresses planning and provides explicit suggestions for completing the Implementation Plan form. The second section discusses preparing for delivery, installation, and maintenance of equipment. The appendices provide a list of local Apple computer dealers, a sample list of workshops offered by the Department of Technology, a list of approved courseware, a glossary of terms, a list of courseware from the Minnesota Educational Computing Consortium (MECC), and a comparison of printers.

SOFTWARE EVALUATION PROCESS

All software is systematically reviewed. Vendors present commercially produced software to the Department staff and District curriculum specialists on a regular basis. Vendors must submit a proposal describing objectives, documentation, discounts, warranty, training, and validity in order for programs to receive consideration. Content and technology experts study the software using the EPIE evaluation instrument to assess technical and instructional quality. When the courseware has been evaluated and a selection made, quantity purchases are made in order to secure discounts which are usually 10-40% below retail price.

SOFTWARE RESOURCE CENTER

The Software Resource Center was established to help administrators, teachers, and parents make intelligent decisions about hardware and software selections. School personnel are encouraged to preview computer programs and equipment before purchase. The Center has copies of technology related periodicals, independent software evaluations, books, and pamphlets. Teachers may also come to the Center to duplicate diskettes. Vendors present new software programs on Wednesday afternoons.

SOFTWARE DEVELOPMENT

The District develops custom software when commercial products are not available or prove too costly for system-wide use. In most instances, these programs are written to address unique needs. For example, an English as a Second Language (ESL) program is under development for students with limited or no English speaking proficiency. High resolution graphics, animation, color and speech are used to teach semantic and spatial concepts.

Introducing the Department of Technology

Advertisers who sell their products on television are seeking a mass market. They are willing to pay hundreds of thousands of dollars per minute in rates because they know their potential customers will number in the hundreds of thousands.

Therefore only products that appeal to the general public are advertised on television – cars, beer, deodorant, frozen foods. Lately a new product is being pitched to the mass market. Squeezed in between ads for orange juice and toothpaste are spots for powerful home computers.

A million Americans have already bought the sophisticated, low-cost units for home use. If nothing else, TV advertising for computers indicates how thoroughly computers have penetrated the American consciousness. They are here to stay.

Clearly, by the time today's first graders are grown, computers will be as common as radios. And there are dozens of other new technologies on the horizon – interactive cable television, new satellite applications, teletext, electronic mail – that hold great promise for home, office and school. The question is, will our children be able to understand them? To fix them? Or even to use them?

The Houston Independent School District is committed to providing its students with the education they will need for a computer-based world. It is also committed to the new technologies because by using them, student and staff productivity can be increased while costs are reduced. In late 1981, the Department of Technology was created to:

- Coordinate District use of technology for instruction and administration
- Prepare staff and students for success in a rapidly changing technological society
- Maintain awareness of state-of-the-art technological innovations
- Evaluate software and promote its effective use for instruction and administration
- Train administrators, teachers and parents in the uses of computers and other technological media
- Develop a clearinghouse to disseminate information on technological developments
- Centralize procurement of hardware and software to assure cost containment and compatibility
- Develop an in-house maintenance capability
- Plan for evaluation and integration of office automation

The Department is addressing these goals through seven major functions: needs assessment and planning, technology training, technical applications, centralized procurement, telecommunications/maintenance, system design and development, and special projects support.

NEEDS ASSESSMENT AND PLANNING

Implementing new technologies into the Houston School District requires comprehensive planning. To help get organized, a Technology Planning Document has been developed to specify staffing patterns, budgetary resources and implementation strategies. Two important topics addressed by this publication are the organizational patterns and the instructional issues that can best be addressed by modern technology.

Another document, the Manual for Writing a Microcomputer Implementation Plan, helps administrators prepare their staff and physical plants for the installation of computers. This comprehensive planning guide assures that programs include documentation, quality control, staff training and equipment compatibility. Several other documents are also available to assist with the implementation of new technology.

This Manual addresses the needs of the present, but with the rate of technological change being what it is, one must constantly anticipate new developments just around the corner. Department of Technology specialists in long range planning and needs assessment analyze the future of technology and how various developments can be used to benefit students, teachers and administrators. Assistance with program planning is also offered to help staff members find new ways to improve productivity and contain costs.

Department of Technology

TECHNOLOGY TRAINING

Before students can learn, their teachers must be trained to use the new tools and how to function in a different role. The Department of Technology provides a competency-based training program for teachers, administrators, and parents. Approximately 350 staff members are oriented each month to the use of the computer as a tutor, tool and tutee.

Because teachers can't come to the Department of Technology every time a problem arises, the District is creating the position of Teacher Technologist. These teachers receive intensive training on computer operation, programming, and classroom applications so they can provide campus-level assistance to other teachers and parents.

These Teacher Technologists would want to add a "C" to the three R's: reading, 'riting, 'rithmetic – and computing. No matter whether they grow up to be pilots, plumbers or physicists, today's students will need to be computer literate. Such training is provided by three programs – Computers Demystified (grades 5-7), Computer Discovery (middle and junior high), and Computer Power (secondary).

All computer science curricula for the school district is developed by the Department of Technology. Programming languages currently taught include BASIC, FORTRAN, Pascal, COBOL and LOGO.

TECHNICAL APPLICATIONS

The Department of Technology's Technical Applications division supports both instructional and administrative users of technology. Computers are used for individualized instruction, too. The District uses approximately 1500 micros to provide supplementary instruction in all subjects, including math, reading, social studies, and science. Every secondary school uses computer managed instruction for tracking progress on reading and math proficiencies.

Non-instructional applications include electronic mail, data base management, and word processing.

CENTRALIZED PROCUREMENT

The school district saves a significant amount of money by buying its computer hardware and software in volume. The Department of Technology handles these procurement duties not only to save taxpayers' money but also to assure compatibility. It would be impossible to provide the training District personnel need on every brand of hardware and software now on the market. For that reason, standardization is important. New commercial products are centrally screened and evaluated before the Department of Technology staff purchases them for districtwide use.

A Software Resource Center enables personnel to preview software products and training materials. Staff also keep up to date on new periodicals and journals.

MAINTENANCE

Buying large amounts of hardware, at no matter what discount, guarantees one type of headache: maintenance. Although modern microcomputers are relatively reliable, they do break down, especially under rough student use. At first the District subcontracted all maintenance work, but when a study showed that by 1985 this cost would be $900,000 annually, the Department of Technology created its own maintenance division. Its objective is to provide faster, better service at reduced cost. If repairs cannot be made quickly, a loaner unit is lent to keep students on-line.

SYSTEMS DESIGN

Because good software is still scarce, the District sometimes finds that there are no programs for certain needs. In these cases the Department of Technology may develop its own. An example is a program now being developed for teaching English as a Second Language. It uses computer-generated speech, graphics animation and color to teach language basics.

Programs have also been written to produce growth improvement plans for teachers, activity fund reports, and inventory summaries for administrators.

SPECIAL PROJECTS SUPPORT

The Special Projects division coordinates wide-scale projects and plans for the integration of emerging technologies. Activities include the annual Technology Fair and other large workshops requiring liaison with other HISD departments.

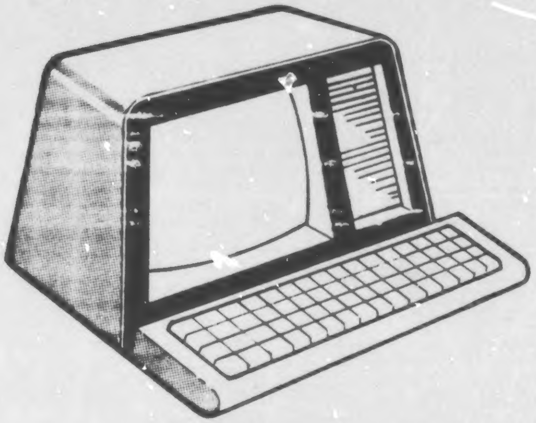
WHERE ARE WE HEADED?

Computers are transforming our economy, providing new opportunities for recreation and learning, and becoming an essential tool at work and at home. This is putting tremendous pressure on education to prepare young people to understand these new tools and use them effectively.

The Department of Technology is continuing to look ahead to identify new needs and new resources in this rapidly changing world, so that all students who graduate from HISD will do so with the knowledge and skills they need to survive and to be productive participants in American society.

MICROCOMPUTER MAINTENANCE

Prior to this year, HISD contracted with five different service companies to maintain its computer equipment. The District has now established its own service department. Problems are reported to the Department, and a repair person is scheduled to report to the site to make repairs.



TRAINING CENTER

The Department of Technology places a high priority on training teachers, specialists, and administrators to use technology appropriately. Training for instructional and administrative applications is provided through a competency-based program. Several full-time trainers provide instruction in classrooms equipped with the hardware required. On most days, 2-3 workshops are conducted simultaneously on subjects as diverse as computer literacy, hands-on operation, word processing, and data management.

TEACHER TECHNOLOGIST

A competency based training program has been developed for teachers identified to use technology for classroom instruction. Certification will be granted upon completion of 296 hours of training in computer operation, literacy, programming, applications, and future trends. Teachers who are certified will receive added salary compensation for their technical expertise.

PROGRAMMING INSTRUCTION

Children in the concrete stages of Piagetian development use the LOGO language development procedure to program mathematical concepts and reinforce reading skills. Problem solving is emphasized. Other languages taught include BASIC, FORTRAN, COBOL and PASCAL.

COMPUTER LITERACY

A K-12 computer literacy curriculum is available. *Computers Demystified*, a District-developed program for grades 5-7, includes a teacher's manual, student activity sheets, computer diskettes, overhead transparencies, and hand held learning devices. Two commercial programs, *Computer Discovery* and *Computer Power*, are used at the middle/junior and senior high levels, respectively.

COMPUTER ASSISTED INSTRUCTION

Approximately 1000 microcomputers are used to provide supplementary instruction in math, reading, social studies, and science. Depending upon the scope of the program, students of all ability groups and grade levels have an opportunity to use the computers. Scheduling and organization plans vary from campus to campus.

TYPING INSTRUCTION

As students begin to use computers at younger ages, it has become necessary to introduce typing skills at the elementary grades. The IBM Writing To Read program uses computers and typewriters as part of the primary reading program for kindergarten and first graders. Instead of conventional basal readers, students use computer tutorials for phonetic instruction. Reading and writing are taught as part of an integrated language arts program. A digital speech unit is available on each computer and cassette recorders are used at a separate listening center. Typing is taught on conventional typewriters as a basic computer literacy skill.

COMPUTER BASED CAREER GUIDANCE

Students and counselors can use the *Guidance Information System* (GIS) to help make good career decisions. Information about job opportunities, training requirements, and prospective schools is available from the program. The career education data base provides information about financial aid.

PARENT INVOLVEMENT

Computers provide support for implementing the District's Operation Fail-Safe parent involvement program. Computer technology is used to communicate with parents through a variety of computer generated reports including an achievement profile, a personalized reading list based on the child's interests and reading level, and a reading prescription for correcting skill deficiencies. COMPUTERS CAN, an extension of this program, allows parents to check out computers for home use to help their children learn basic skills. The parents and children receive 12 hours of training after school.

NEWSLETTER

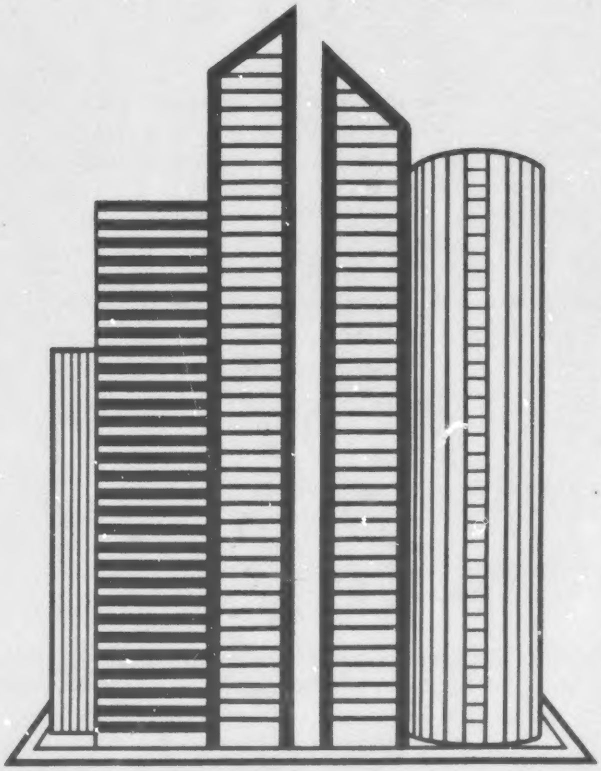
The Department of Technology *Technogram* is the medium used to communicate with technology users. It is published on a bimonthly basis and includes news articles as well as regular columns. All administators in the District receive a copy.

TECHNOLOGY MAGNET SCHOOLS

Several schools have special programs which attempt to immerse students in technology applications. The focus varies (e.g., music, science, math, engineering) depending upon the objectives of the program. Each school has a non-traditional curriculum that meets a specialized need. Maximum use of computer technology provides students with a unique opportunity to develop literacy and problem solving skills.

BUSINESS/ COMMUNITY INVOLVEMENT

More than 100 businesses have joined HISD in a Business/School partnership program. Companies provide experts, equipment and/or financial assistance to schools pursuing technology goals. Companies participating include IBM, Shell, and Houston Lighting and Power.



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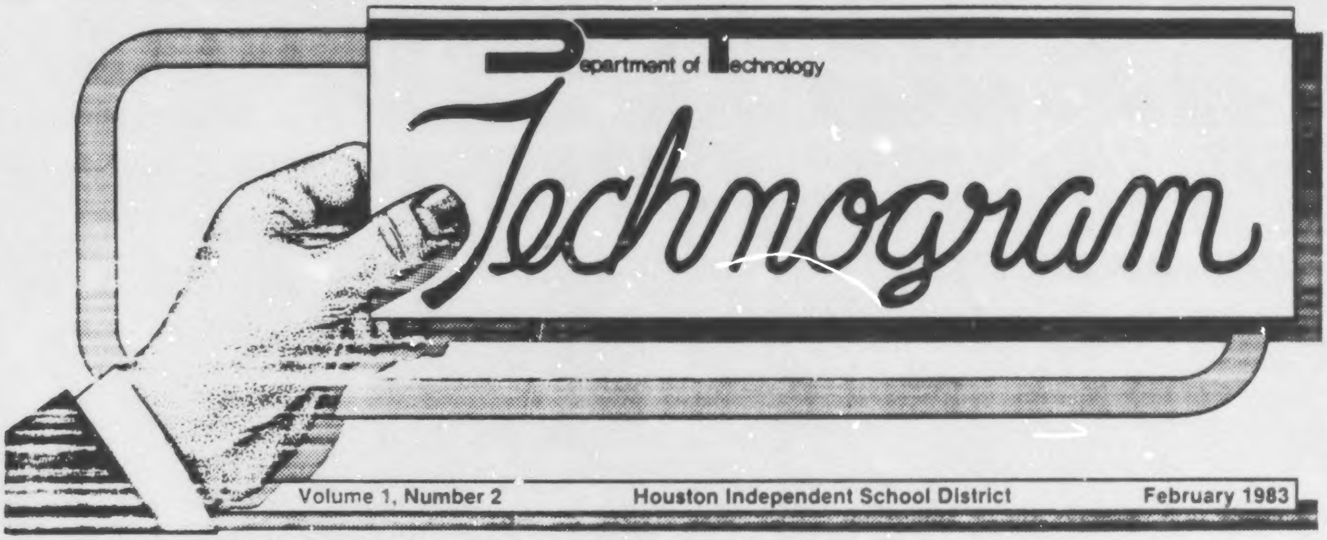
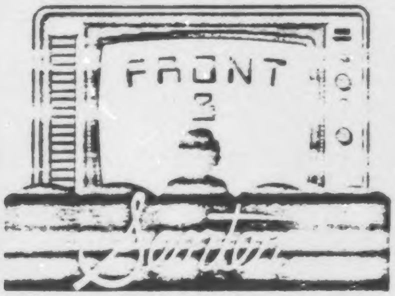


Volume 1, Number 2 Houston Independent School District February 1983



By Dr. Joy Senter

Does being computer literate mean being able to program a computer? Do you need to know how to assemble an automobile before driving it, or to build a microwave oven before using it? Educators are often confused about what constitutes computer literacy. Whether it is being able to program or being able to operate a computer, or both, the definition of computer literacy can be confusing.

More than a dozen computer languages are now available to program microcomputers. These include: BASIC, one of the earlier languages; Pascal, featuring structured programming; Forth, a relatively new language; FORTRAN, for scientific applications; COBOL, used for business programming; Logo, written to allow children to do simple programming; and Ada, named for Ada Byron (daughter of Lord Byron, and the first programmer), recently adopted for use by the Department of Defense.

Different languages are adapted to different needs. One might not be sufficient for all programming needs. With the rate of change being what it is, the language a student learns today may

(continued on page 8)

OTA RELEASES TECHNOLOGY REPORT

The Office of Technology Assessment (OTA) has released a report, *Informational Technology and Its Impact on American Education*, which cites the Houston School District as a case study.

The Office of Technology Assessment is an agency of Congress. Its report singled out HISD as a leader in urban education, specially noting the District's magnet school concept, its cooperation with business and industry and its coordinated approach to educational technology.

The report notes that in the last ten years, federal funding for educational technology has dropped "precipitously"

(continued on page 8)

FACILITATORS RECEIVE TRAINING FOR CHAPTER I PROGRAM

When the Department of Education created the teacher facilitator program, the idea was to build a highly trained cadre of teachers who could then share their expertise with classroom teachers.

This year, HISD's 13 teacher facilitators hav had some new duties concerning computer technology added

(continued on page 2)

UPCOMING PREVIEW SESSIONS FOR SCHOOL PERSONNEL

Preview of approved courseware will be from 3:00 - 4:00 on the following dates:

March 9 — Geography Search
April 27 — Arcademics

Call Gloria Franklin at the Department of Technology (960-8888) to make reservations to attend. ▪

PASCAL CHOSEN FOR USE IN ADVANCED PLACEMENT COMPUTER SCIENCE COURSE

HISD, along with other leading school districts across the nation, will soon be offering an advanced placement course in college-level computer science. The course has been designed by public school and college educators in conjunction with the College Board and the Educational Testing Service.

One big problem the course designers had to solve was which computer

(continued on page 2)

CABLE TV TO BECOME IMPORTANT LINK IN EDUCATION

Would you like to stay home and order your groceries over the phone by making your selections from your TV screen? Or perhaps you might wish to have your house monitored for fire and burglary during the day while you are at work. These services can be provided by cable TV.

Cable TV was born over 30 years ago but it is just now plugging into the national and local scene. Services presently offered include movies (HBO and Showtime), sports, news, weather,

(continued on page 8)

BEST COPY AVAILABLE

Technology Fair

Spring is coming and so is the Technology Fair which is scheduled for April 15th and 16th. The following dates are important deadlines for you to remember as you prepare your entries.

April 4— Applications of school contest finalists for each grade level and category must be submitted to the Area Technology Fair Liaison person.

April 7 — All application forms for area finalists must be forwarded by the Area Technology Fair Liaison person to the Department of Technology. ■

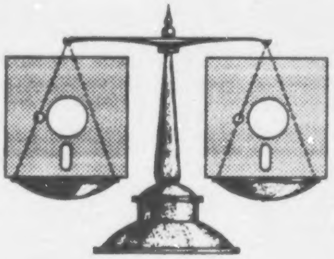
Facilitators...(from page 1)

to their job description. The Chapter I (formerly Title I) program, designed to help the educationally disadvantaged, has found that these students respond especially well to computers. Now in their fourth year of operation, the District's teacher facilitators, directed by Horace Grays, serves approximately 274 teachers in the 27 Chapter I campuses with computers.

An important aspect of the facilitators' responsibilities is to attend Department of Technology training sessions to keep current with new developments.

Some of the software that has been singled out as particularly effective with disadvantaged students includes:

- Diascriptive Reading - a tutorial reading program which contains six diagnostic tests for each skill level and 36 developmental programs for levels 3-8.
- Hartley Reading—presents vocabulary, vowels, consonants, letter recognition, capitalization, homonyms, nouns, and word families.
- SRA Computer Drill and Instruction in Mathematics - stresses student record keeping capabilities for addition, subtraction, whole numbers, multiplication, division, fractions and decimals for grades 1-6. ■



New Products

Three HISD elementary schools are pioneering a computer-based reading program using IBM's new personal computer. Pugh, Walnut Bend and Garden Villas are using Writing to Read, an audio-supported program that teaches reading, writing and typing to kindergarten and first grade students. Computers, in conjunction with tape recorders, typewriters and workbooks, are used in place of standard reading basals. The computers use digital speech so students can hear words and sounds that are presented.

The unique approach builds on youngsters' oral language skills. ■

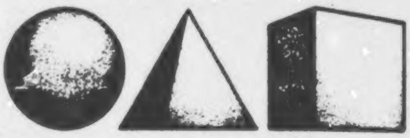
Pascal...(from page 1)

language to use. The most common ones - BASIC and FORTRAN - were found to be too unstructured and nonstandardized.

The solution proved to be Pascal, a language considered "software portable." In other words, programs written in Pascal for one brand of computer will work with other brands. Pascal was designed to be easy enough for most students to use. It also features enhanced graphics. The language is in the final stages of being internationally standardized.

To support campuses interested in offering the new Pascal-based advanced placement course, HISD is using the computer literacy curriculum called *Computer Power*. Teachers can introduce secondary students to the computer using this new curriculum. Fortunately, only two Apple computers are required for each class.

Workshops in Pascal are taught by Jane Stone who is completing her doctorate in Computer Science. ■



Bits & Pieces

IBM expects to sell one million personal computers by the end of 1984. They have added 500 employees to assemble them..... Every 10 seconds TIMEX manufactures a computer that sells for $100....A robot "BUTLER" that sold for $15,000 was featured in the Neiman-Marcus Christmas catalogue.....A robot which can climb stairs and has vision, voice recognition, and speech synthesis capabilities will be available this year in kit form from Heath for under $2.999.....Britain has decided to pay one-half of the cost of installing computers in its elementary schools..... Electronic yellow pages may be available soon from AT&T.....The computer industry is filling its sales force with used car sales persons.....By 1985, seven of every ten adults who work will use a computer on the job.....Almost 10,000 kinds of jobs have disappeared from the economy in the last 25 years, many of them displaced by computers and automation..... Approximately the same number of types of jobs have been created during the same period—most of them by progress in computers and information industries.....Dozens of American teenagers earned more than $50,000 each last year just by writing programs on their home computers.....A new brochure entitled "Computer Literacy - The 4th R" will be available for use on Fail-Safe Conference day. ■

Staff Box

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February 1983

Patricia Sturdivant, Associate Superintendent

Joy Senter, Editor

Steve Scott, Design/Layout/Illustrator

Comments and suggestions may be sent to the editor. ■

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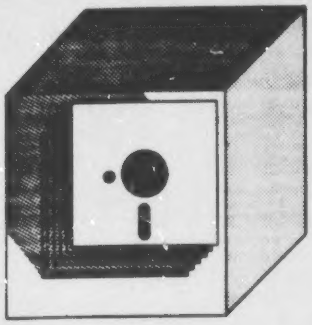

Curriculum Corner

Can you imagine elementary school students programming computers? A new programming language, Logo, has made it possible.

The language, developed by Seymour Papert at the Massachusetts Institute of Technology, is so simple that three year olds can write programs. Actually, Logo is not taught as a subject but instead learned indirectly as children perform activities.

Youngsters are introduced to the computer when they draw geometric designs on the screen using the Logo turtle, a triangular figure located in the middle of the screen. As the turtle is moved, a stylus leaves tracings on the screen.

To change the turtle's position, the student must tell it to turn left or right a certain number of degrees. Children like the system because they can learn so much in just the first hour. They quickly find that they can design complex graphics patterns by building one part at a time. Moving the turtle allows a student to explore spatial geometry in a manner analogous to his own movements through space.

A unique feature of Logo is that the student is in control; he tells the computer what to do rather than just responding passively to a pre-programmed lesson. Many educators believe that learning should not be something done to students but rather something they do for themselves. Logo can promote a sense of power and mastery.

The language, which is used by college-level students as well as youngsters, can illustrate complex mathematic concepts. Applications include geometry concepts like circles around a point, polygons, stars, and judging angles and coordinates. Arithmetic concepts cover factorials and powers of numbers, multiples, factors, decomposing numbers and adding binary numbers.

Logo's descriptive nature encourages children to derive one concept from another in such a way that they are aware of the relatedness among them. Students go on to formulate and solve their own mathematical problems.

Logo shows great promise. Evaluations find below average students achieving better in mathematics and other areas. It may also be used to teach language arts and esthetics.

Several schools are piloting Logo this year. Teachers and administrators from McGregor, Lockhart, Askew, River Oaks, Rogers and Pugh were trained this summer. Logo will be expanded to more schools to teach problem solving in the third and fourth grades. Teaching materials are now being developed by the Department of Technology's Tom Boudrot and Kelly Flynn. ■

Software Search

An old acronym among computer nuts is GIGO, which is short for "Garbage In, Garbage Out." The concept is that a computer can only manipulate what is put into it in the first place.

The concept applies to education in that a computer in the classroom is only as good as its software. Consequently, the Department of Technology makes every effort to review commercially produced software as it is marketed.

Software vendors are invited to present their latest products to Department of Technology staff and District curriculum specialists on the first and third Wednesday of each month. Presentations are held from 3:00 to 4:30 p.m. Staff members then study the software and, with input from curriculum specialists, make recommendations for purchase.

The EPIE Evaluation Form is used to assess technical and instructional quality. Factors considered in evaluation include:

- Well defined objectives
- Instructional quality
- Warranties
- Back-up provisions
- Quantity discounts
- Networking capability
- Local vendor support
- Inservice training

If no published reviews are available, the program may be sent to the classroom for field testing. A committee reviews programs that are considered for district-wide use. Then negotiations for quantity purchases are made. Members of the District's Courseware Committee are Carol Kuykendall, Madolyn Reed, Sharon Williams, Peggy Moller, Dan Ellison, Carol Selig, Tom Boudrot, Jane Stone and Judy Peters. ■

OOOH GIVE ME A HOME....
WHERE THE SMOKERS DON'T ROAM.

Diskette Care

Have you ever worked for many hours only to have that work disappear in a matter of seconds? Mishandling or "excessive" use of floppy disks can damage information stored on them. A small amount of damage, depending upon where it occurs, can ruin the entire disk. The following precautions should be taken when handling diskettes:

- Store each disk in an upright position in the dust cover.
- Place disk back in its box when not in use.
- Store disk boxes away from dust, extremes of temperature, and magnetic fields (television, monitors, and electrical motors.)
- Do not smoke in an area where microcomputers are located.
- Do not store your software in the car because of damage from extreme hot and cold temperatures.

Some cases of "mysterious" floppy disk failure include:

- Exposing disks to industrial floor waxers that throw a big magnetic field as they go.
- Labeling disks by writing directly onto the disk label with a ballpoint pen.
- Storing important, often-used disks in the disk drive for convenience.
- Using the disk as a bookmark in the software documentation. ■

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Cable...(from page 1)

cultural and religious programming, special interest programming (narrowcasting), security and energy services, local shopping information, home banking, teletext, and interactive TV (QUBE).

Educators have been slow to recognize the usefulness of cable television to enhance instruction and reduce costs. However, now that two-way capabilities have been refined, educators are eyeing many applications:

- Access to well-written CAI from a central software bank
- "Critical moment" information for current research and long-range planning from distant data banks
- Transfer of data from school to home
- Interactive video with students responding by keyboard and receiving an "instant" response
- Computer literacy and college credit courses
- Electronic field trips to museums and other public facilities
- Staff inservice transmitted to individual schools from a central location
- English as a Second Language (ESL) offered in the school and home
- Access to films and other video materials from a central media center
- Program production
- Dialog between students within the school district and with outlying school districts

Will HISD soon be getting this cornucopia? That remains to be seen, because these services must be negotiated for when franchises are granted to the cable companies. In 1979, the Houston City Council granted five franchises to first wire the city into the cable age. Since that time user complaints about quality and service have been legion. Educational cable services have been almost nonexistent.

But the snags in the cable lines may be straightening out. Currently, the Warner Amex Cable Company is proposing to buy Gulf Coast and Westland Cable. At public hearings on the proposed sale, HISD's Patricia Shell and John Baker testified on the need for more cable educational programming.

The Department of Technology prepared a position paper outlining state-of-the-art developments, educational uses of cable TV and guidelines for upcoming franchise negotiations.

In 1984, the Houston City Council will conduct a performance review to evaluate the original franchises granted in 1979. Citizens and educators will want to give their input at that time. The spiraling costs of education make it imperative that Houston not lose another chance to cut expenses and improve instruction via cable TV.

Front and Senter (from p. 1)

be obsolete by the time he goes to work. Is it necessary to be able to program to be considered computer literate?

Perhaps a more accurate term might be *COMPUTING* literate. This term may be defined as having the knowledge and ability to use the computer as a tool. It means being able to use a computer to solve problems and do tasks, being comfortable with keyboards and other input devices, and knowing the strengths and limitations of the machine.

The emergence of new programs and computers which are easier to use means that not everyone has to learn programming. How well you can use a computer as an extension of your capabilities is important. Can you use it to improve your productivity? Can you use it as a problem solving tool? If not, how can these survival skills be learned?

There are many ways students can acquire computing literacy. Computer assisted instruction users are learning computing skills by switching on the machine and doing the work they select from the menu presented on the screen. By knowing how keyboards work, students can assume responsibility for their own learning and therefore teach themselves. (Don't worry, teachers, you can never be replaced. Only your role will change!)

Word processing can be used in English classes to learn composition and editing. Historical research and future projections can be done by accessing data bases through a keyboard device on a personal computer. This new way of retrieving and manipulating data also increases the knowledge base of students.

Simulations can show math and science students how things move and interact physically. A National Science Foundation commission found many students "tuned out" the subjects of science and math by the third grade partly because of the way information was presented. However, youngsters like these subjects when presented on television or at science and technology museums.

Two science teaching museums in the San Francisco Bay area are on the leading edge of this process. One, the Exploratorium, uses microcomputers and simulation to illustrate exponential growth in a graphic, interactive way. The student is asked to choose a growth rate for a "blue" and "gold" population. Using dials interfaced with an Apple microcomputer, the student can set the program so that the "blue" birth rate is slightly greater than the rate of the "gold" population. A push of the button starts the population reproducing.

For the first twenty seconds, the blue and gold dots appear at about the same rate; but then suddenly the blue overwhelms the gold, covering the screen. A fundamental law becomes obvious—principles of exponential growth can cause a great amount of difference in numbers of two populations even with only a slight difference between the initial stages of the two populations.

These are but a few examples of how a computer can become a valuable tool for those who acquire computing literacy. The wave of the future will likely crest on a knowlege explosion. Of vast importance for riding the wave will be an ability to access and manage information wisely.

For those who seek to enter the computer field as a vocation or avocation, the ability to program will be necessary. But for those who wish only to use the computer as a tool, access to information and computing skills will be the keys. Join the crowd of those using computers and don't be left behind or allow your students to miss the boat!

I appreciate all the responses I received to the last issue of the TECHNOGRAM. Please feel free to call me with any suggestions or questions you might have.

OTA...(from page 1)

while development of noneducational applications has increased "rapidly." The result is that public schools, "beset by problems that technology might mitigate, have lagged behind in adapting to technological changes."

According to the report,

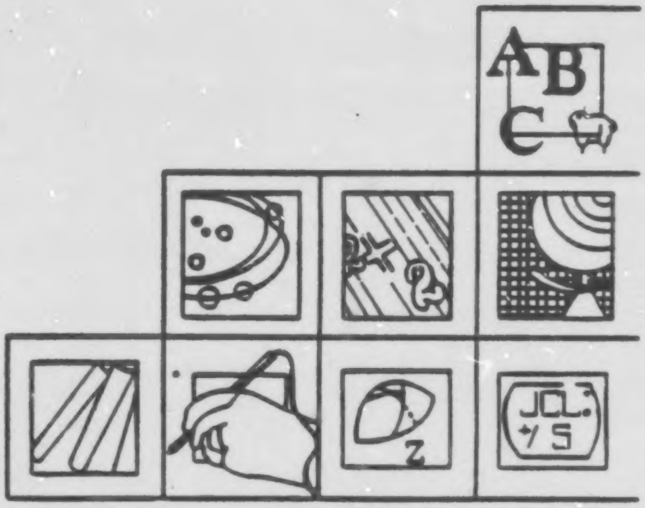
- The U.S. is undergoing an information revolution.
- The growing use of technology in society is creating major new demands for education and increasing the penalty for not responding to those demands.
- The information revolution is causing new stresses on public schools and libraries in particular.
- Information technology holds great promise as a mechanism for public education.
- Much remains unknown about the psychological and educational effects of technologically oriented instruction. Consequently, caution is called for in undertaking any national effort along these lines.

CONFERENCE PROGRAM

R&D SPEAKS

EVALUATION OF EDUCATIONAL SOFTWARE

MARCH 16-17, 1983



sedl / austin

AGENDA

Wednesday
March 16, 1983
Fourth Floor

8:30 - 9:00 a.m.	Coffee, Conversation, & Registration
9:00 - 9:15 a.m.	WELCOME, CONFERENCE OVERVIEW Dr. Martha Smith Director, Regional Exchange Nancy Baker Jones Project Coordinator, Regional Exchange
9:15 - 10:15 a.m.	KEYNOTE ADDRESS Dr. Vicki Blum Cohen Director, Instructional Design ISO Communications New York
10:15 - 10:30 a.m.	BREAK
10:30 - 11:30 a.m.	STATE APPROACHES: The Texas Model Vicki Smith Coordinator for Computer Based Instruction Region IV Educational Service Center Houston, Texas
11:30 - 1:00 p.m.	LUNCH (On Your Own)
1:00 - 2:00 p.m.	STATE APPROACHES: The Florida Model Dr. Sandra Turner Associate Director Florida Center for Instructional Computing
2:00 - 2:15 p.m.	BREAK

2:15 - 3:15 p.m.	SCHOOL DISTRICT APPROACH: Houston I.S.D. Patricia Sturdivant Associate Superintendent Department of Technology Houston Independent School District
3:15 - 3:30 p.m.	BREAK
3:30 - 4:00 p.m.	RESOURCES FOR SOFTWARE EVALUATION Nancy Baker Jones
4:00 - 5:00 p.m.	ROUND TABLE DISCUSSION An opportunity for the six states in the SEDL region to share with participants and presenters the work going on in their own agencies, to question presenters, to serve as resources to others.
5:00 p.m.	DISMISS FOR THE DAY

Thursday

March 17, 1983

Third Floor

8:30 - 9:00 a.m.	Coffee and Conversation
9:00 - noon	EVALUATION LABORATORY This will be a "hands on" session designed to familiarize participants with various software evaluation procedures Dr. Vicki Blum Cohen, Instructor
12 - 1:00 p.m.	STATE REPORTS, SUMMARY, CONCLUSIONS
1:00 p.m.	ADJOURN

PRESENTERS

VICKI BLUM COHEN Dr. Cohen is Director of Instructional Design for ISO Communications, New York, where she is designing curriculum for interactive video disc, among other projects. Through an Exxon Foundation grant, she is also producing reviews of courseware in mathematics, science, and communication skills. She was instrumental in designing the EPIE software evaluation form; her research in software evaluation was the basis for her doctoral thesis at Teachers College, Columbia University.

SANDRA TURNER Dr. Turner is Associate Director of the Florida Center for Instructional Computing and Assistant Professor of Computer Education at the University of Southern Florida/Tampa. She directs the software evaluation efforts of the FCIC, has designed a software evaluation model, and is training educators around the state to use it. As Assistant Professor, she teaches courses in the University's new graduate program in computers in education.

VICKI SMITH Ms. Smith is Coordinator for Computer Based Instruction with the Region IV Education Service Center, Houston, Texas. As such she coordinates a statewide microcomputer courseware evaluation project, funded through the Texas Education Computer Cooperative (TECC). Her work involves coordinating the submission of software, directing evaluation, coordinating the dissemination of results and conducting training for the project's advisory committee. She also provides technical assistance to 55 school districts in teacher training and implementation of computer literacy goals. She is a founder and board member of the Texas Computer Education Association and serves it as Secretary Treasurer and newsletter editor.

PATRICIA STURDIVANT Ms. Sturdivant is Associate Superintendent of the Department of Technology, Houston Independent School District. As such she coordinates computer-related operations, including training, technical support, systems design, telecommunications, and hardware/software procurement. Houston ISD is one of six school districts in the U.S. participating in the U.S. Department of Education's Urban Technology Consortium, in which educators evaluate software. She has extensive experience coordinating instructional computing for teachers and administrators, and has been an evaluator for the MicroSIFT network.

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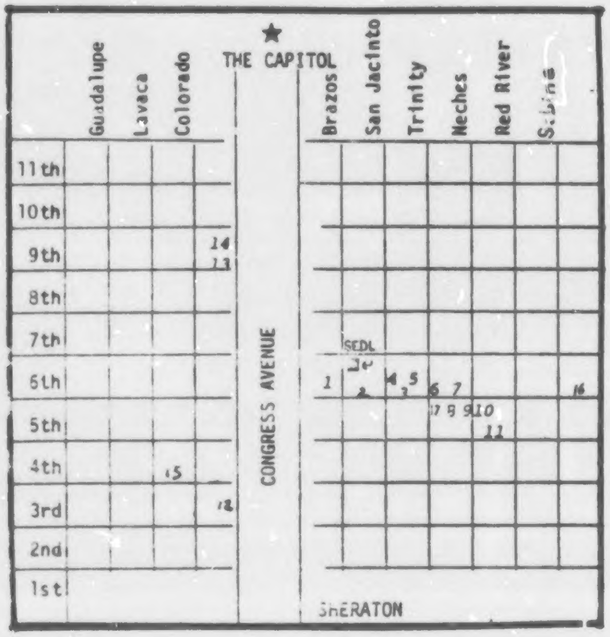
Thanks are due to the following people for contributing to the success of our conference: to Sherry Rylander, Austin's Radio Shack representative and Jim Savoie, Radio Shack's District Manager, for their loan of hardware for our evaluation laboratory, and to Pat Sturdivant and Vicki Blum Cohen for loaning software used in the laboratory.

A SELECTED GUIDE TO DOWNTOWN RESTAURANTS & NIGHT SPOTS

Most of the restaurants and night spots are located on or nearby historic East Sixth, also called Old Pecan Street, or on Congress Avenue. Below is a sampling of what's available. Lunch & dinner unless otherwise noted. Prices are generally moderate.



1. Driskill Hotel. Much of Texas' political history has been written here. Tour the old lobby and mezannine and eat at The 1886 Room, run by the Austin Heritage Society (lunch only), the dining room, or the Driskill Bar, both operated by the hotel's new management.

2. Casita Jorge's. Mexican food in a pleasantly restored 19th century building. Dynamite margaritas.

3. Old Pecan St. Cafe. 310 E. 6. Standard quiche, crepe, soup & salad fare. Great desserts.

4. O'Sahara. Between 6th and 7th on San Jacinto. Middle-eastern food at moderate prices.

5. The 606 Bar-Restaurant. 606 Trinity. New Orleans flavor in food & atmosphere.

6. Wylie's. 400 E. 6. Great sandwiches & other dishes at this chic restaurant/bar.

7. Juan Goldstein's Caviar Bar. 404 E. 6. Wonderful margaritas & light entres, in addition to caviar & champagne. Opens 4 pm.

8. Dan McKlusky's Butchery. 419 E. 6. Steaks, salads & sandwiches. Lunch & dinner.

9. Gordo's. 421 E. 6. Pool & billiards on antique tables. Nicely renovated 19th-c. commercial building.

10. Balboa Fern Bar. 501 E. 6. Just opened and looks good.

11. Gianni's. 504 E. 5. Located in the old Depot Hotel. Italian food in a charming atmosphere. Dinner only.

12. Gambrinus. 314 Congress. Restaurant/bar opened by a Belgian. Happy hour fried zuchinni treats.

13. Waterloo Ice House. 906 Congress. Good hamburgers & casual atmosphere.

14. The Avenue. 908 Congress. 1980's ceiling fan chic.

15. Old Spaghetti Warehouse. 117 W. 4. 19th-c. warehouse adaptively reused. Fun decor.

16. Raw Deal. 700 E. 6th. Steaks, fries, beer, and Texas funk.

17. The Paradise. 401 E. 6th. Wonderful black bean nachos. Art work changes regularly for an interesting atmosphere.

RESOURCES FOR SOFTWARE EVALUATION

RESOURCES FOR SOFTWARE EVALUATION

The resource information listed on the following pages is taken from Evaluation of Educational Software: A Guide to Guides. This publication is a reference guide to ten of the most useful evaluation systems and forms currently available for evaluating software. Forms and abstracts from major software reviewers (MECC, MicroSIFT, EPIE, SOFTSWAP, etc.) are included along with articles, sample reviews, and lengthy comprehensive lists of sources of reviews, directories, clearinghouses, and databases. Published cooperatively by the Regional Exchange at the Southwest Educational Development Laboratory and the Northeast Regional Exchange, Inc., Evaluation of Educational Software is available from SEDL, or from NEREX, Inc.

In addition to this bibliography, the following resources were available at the conference:

Index to Journal Reviews of Instructional Software, San Mateo County Office of Education. This index lists sources of reviews of commercially available educational software found in journals published from 1980 to 1982. In addition to information on where to locate the review, each entry indicates the general subject area, the publisher, and the system(s) on which the program can be used.

The 1983 Educational Software Preview Guide, Educational Software Evaluation Consortium, Vallombrosa Center, Menlo Park, California. This guide is a preview list of favorably reviewed microcomputer software. The preview guide is designed to assist educators in locating software for preview; it is not intended to endorse these products for purchase without examination.

RESOURCE INFORMATION

BOOKS

Burke, R.L. *CAI Sourcebook*. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1982.
Includes a section on "CAI Courseware Review."

Coburn, et al. *Practical Guide to Computers in Education*. Reading, MA: Addison-Wesley, 1982.
Contains a discussion of educational software selection.

Criteria for Evaluating and Selecting Microcomputer Courseware. Baltimore, Maryland: State Department of Education, 1982.

Douglas, Shirley and Gary Neights. *A Guide to Instructional Microcomputer Software and A Guide to Microcomputers*. Pennsylvania Department of Education, reprinted by Connecticut Department of Education, 1980.

Introduction to selecting software and implementing microcomputer-based instructional systems.

Edwards, Judith B., et al. Computer Applications in Instruction: *A Teacher's Guide to Selection and Use*. Hanover, NH: Time Share Corporation, 1978.

Introduction to computers in education, including instructional software selection.

Northwest Regional Educational Laboratory, *Evaluator's Guide for Microcomputer-based Instructional Packages*. International Council for Computer Education. Eugene, Oregon: 1982.

The guide uses MicroSIFT's evaluation form, describes the process, and

Intentional Educations, Inc. Computers in Education: A Practical Guide. Reading, MA: Addison-Wesley, 1982.

Includes evaluation criteria and strategies for implementing computer-based instructional systems.

Isaacson, D. How to Design Educational Microcomputer Programs. Fresno, CA: California State University, 1982.

A teacher's guide to designing software. Illustrations, sample programs, criteria, etc.

Naiman, Adeline. Microcomputers in Education: An Introduction. Chelmsford, MA: Northeast Regional Exchange, 1982.

A beginner's guide to the use of microcomputers in schools. Includes a section on software selection, and sample software evaluation forms.

National Council of Teachers of Mathematics (NCTM). Guidelines for Evaluating Computerized Instructional Materials. Reston, VA: NCTM, 1981.

Guides for evaluation and a form are included.

Poirot, James. Computers and Education. Manchaca, TX: 1980.
Includes a discussion on evaluation of software.

Poirot, James, Kathleen Swigger, and Merridee Heidt. Evaluation Guide for TABS Related Courseware. Houston, TX: 1981.

This book is designed to aid Texas teachers in evaluating software related to state-wide assessments of basic skills achievement. It includes an evaluation form which allows reviewers to obtain a quantitative measure of software effectiveness.

Pitts, Marcella. The Educator's Unauthorized Microcomputer Survival Manual. Washington, D.C.: Council for Educational Development and Research (CEDaR), 1982.

Strohmenger, Todd. Guidelines for Selecting and Developing Secondary Remediation Software. Charleston, WV: Appalachia Educational Laboratory, 1983.

In disk format, this publication is designed to aid in assessing software for students with developmental problems other than physical or mental disabilities.

Texas Education Agency. Guide for Selecting A Computer-Based Instructional System. Austin, TX: Texas Education Agency, 1982.

Contains guidelines for software selection.

Vann, Eric G. Microcomputers in the Classroom: A Practical Guide for Educators. Glen Ellen, IL: Institute for Educational Research, 1981.

Willis, Jerry and William Danley, Jr. Nailing Jelly to a Tree: A Guide to Educational Research, 1981.

Directories

The Addison-Wesley Book of Apple Computer Software, 1982
The Book Company
16720 Hawthorne Blvd.
Lawndale, CA 90260

Describes and evaluates all types of Apple software.

American Peripherals
122 Bangor Street
Lindenhurst, NY 11757

Two editions; one lists 1200 educational programs for PET; the other lists 400 for VIC-20.

The Apple Software Directory, Volume Three: Education
WIDL Video
5245 West Diversey Avenue
Chicago, IL 60639

Describes and indexes by subject, Apple educational software from more than 400 vendors.

Atari Program Exchange
Atari, Inc.
P.O. Box 427
155 Moffett Park Drive, B-1
Sunnyvale, CA 94086

Quarterly editions. Atari's compilation of user-written software. Includes special education section.

CIE Software News
Computer Information Exchange
Box 159
San Luis Rey, CA 92068

A newsletter with a continuously updated directory of software, books, and hardware news.

Classroom Computer News Directory of Educational Computing Resources
Intentional Educations, Inc.
341 Mt. Auburn Street
Watertown, MA 02172

Yearly, a reference arranged by category, state, region, type of computer. Lists sources of software reviews.

Commodore Software Encyclopedia
Commodore Business Machines
Computer System Division
Systems Marketing Group
681 Moore Road
King of Prussia, PA 19406

Lists Commodore software in seven categories, including education.

Curriculum Product Review
530 University Avenue
Palo Alto, CA 94301

Lists texts, AV materials, hardware and software.

Educator's Handbook and Software Directory
Vital Information, Inc.
7899 Mastin Drive
Overland Park, KS 66204

Lists evaluated educational programs for the Apple. Includes articles on microcomputer applications in education.

Huntington Computing Catalog
P.O. Box 1297
Corcoran, CA 93212
Lists educational and noneducational programs.

IDEAS
ECS (MR1-1/M40)
Digital Equipment Corporation
200 Forest Street
Marlboro, MA 01752

Lists educational software for DEC mainframe computers.

Index to Computer-Based Learning, 1981 Edition
Anastasia Wang, ed.
Instructional Media Laboratory
University of Wisconsin
P.O. Box 413
Milwaukee, WI 53201

Lists almost 5000 educational programs.

Instant Software
80 Pine Street
Peterborough, NH 03458

For TRS-80, Apple, PET, TI-99/4 and Atari 800 microcomputers.

Instructor's 1982-83 Computer Directory for Schools
Attn: Elsa Silander
P.O. Box 6099
Duluth, MN 55806

Includes articles on software selection and lists of educational software grouped by curriculum area, machine compatibility, and publisher.

International Microcomputer Software Directory
Imprint Software
420 South Howes Street
Fort Collins, CO 80521

Lists microcomputer software in all areas, including education.

K-12 Micro Media
172 Broadway
Woodcliff Lake, NJ 07675

Marck
280 Linden Avenue
Brandon, CT 06405

Lists tested educational programs for Apple, Atari PET, and TRS-80.

Micro Co-Op Newsletter
P.O. Box 432
West Chicago, IL 60815

Bimonthly newsletter which provides software listings and descriptive comparisons of programs.

Microcomputers Corporation Catalog
34 Maple Avenue
P.O. Box 8
Armonk, NY 10504

Listing of computer accessories and software; many programs are educational.

Minnesota Educational Computing Consortium (MECC). *Instructional Computing Catalog*
2520 Broadway Drive
St. Paul, MN 55113-5199

A catalog of educational courseware for Apple II and Atari computers.

Opportunities for Learning, Inc.
Dept. L-4
8950 Lurline Avenue
Chatsworth, CA 91311

Elementary through college level.

Queue
5 Chapel Hill Drive
Fairfield, CT 06432

Catalogs educational software for Apple, Atari, PET, and TRS-80.

Radio Shack TRS-80 Educational Software Sourcebook
From: Radio Shack Stores

Describes software available for TRS-80 microcomputers in eleven subject areas.

Reference Manual for the Instructional Use of Microcomputers
JEM Research, Discovery Park
University of Victoria
P.O. Box 1700, Victoria, BC
CANADA V8W 2Y2

Indexes and evaluates educational programs for the Apple II.

School Microware Directory
Dresden Associates
P.O. Box 246
Dresden, ME 04342

Lists and describes educational programs for Apple II, Atari, PET, and TRS-80.

Scholastic Microcomputer Instructional Materials
904 Sylvan Avenue
Englewood Cliffs, NJ 07632

All programs have passed educator evaluation tests.

The Software Directory
Software Central
P.O. Box 30424
Lincoln, NE 68503

Lists and briefly describes programs for various microcomputers.

Sources for Courses
TALMIS
115 North Oak Park Avenue
Oak Park, IL 60301

Annually lists educational programs for Kindergarten through College.

Starbek Software Directory
11990 Dorsett Road
St. Louis, MO 63043

Describes over 1000 Apple-compatible programs.

1982 Swift's Directory of Educational Software, Apple II Edition
Sterling Swift Publishing Co.
1600 Fortview Road
Austin, TX 78704

Describes commercial and noncommercial educational programs for the Apple.

Texas Instruments Home Computer Program Library, 1982
From: Texas Instruments Dealers

Lists software for the Texas Instruments microcomputer.

101

User's
2520 Broadway Drive
St. Paul, MN 55113

Lists Apple and Atari Software developed by educators for the Minnesota Educational Computing Consortium (MECC).

VanLoves Apple II/III Software Directory, Vol. II

Vital Information, Inc.
7899 Mastin Drive
Overland Park, KS 66204

A comprehensive directory of Apple software which includes an educational software section.

Articles

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Hunter, Beverly, "How to be a Program Critic," *Electronic Learning*, 1 (January-February 1982):65.

Judd, Dorothy, and Robert Judd, "Evaluation of Instructional Programs for Microcomputers," *Educational Computer*, 2 (March-April 1982):16-17.

Kansky, Bob, William Heck, and Jerry Johnson, "Getting Hard-Nosed about Software: Guidelines for Evaluating Computerized Instructional Materials," *The Mathematics Teacher*, 74 (November 1981).

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"Level-Headed Guide to Software Evaluation," *Classroom Computer News*, 1 (July-August 1981):22-23.

Moursund, David, "Some Thoughts on Reviewing Software," *The Computing Teacher*, 7 (June-July 1980).

Needle, David, and Deborah Wise, "Helping Teachers Pick Software," *InfoWorld*, 3 (Dec. 7, 1981):25.

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Roblyer, M.D., "When is it 'Good Courseware?': Problems in Developing Standards for Microcomputer Courseware," Educational Technology, 21 (October 1981):47-54.

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Wise, Deborah, "Software is the Key to Educational Computing, Teachers Say," InfoWorld, 3 (November 23, 1981):17+.

Clearinghouses and Information Centers

Apple Computer Clearinghouse for the Handicapped
Prentke Romich Company
R.D. 2, P.O. Box 191
Shreve, OH 44676

A source of information about Apple software being developed for handicapped people.

Apple for the Teacher
c/o Ted Perry
5848 Riddio Street
Citrus Heights, CA 95610

Operates the National Computer-Assisted Library for the Apple, a software collection of international scope. Publishes a newsletter containing reviews.

Boston Computer Society (BCS)
Educational Resource Exchange
Three Center Plaza
Boston, MA 02108

Maintains an educational resource exchange which disseminates information on software selection.

California Library Media Consortium
San Mateo County Office of Education
333 Main Street
Redwood City, CA 94063

Organized in 1981 by 54 library media specialists. Publishes COURSEWARE REVIEWS. All reviews are written by educators and based on classroom use of software.

California Software Clearinghouse
Office of Staff Development
State Department of Education
721 Capitol Mall
Room 634
Sacramento, CA 95814

The Clearinghouse supports fifteen Teacher Education and Computer Centers (TECC) around the state, provides staff development, print resources, a collection of software and disseminates evaluations of software.

CONDUIT
P.O. Box 388
Iowa City, IA 52244

Tests, reviews and distributes software; the focus is on software for higher education.

Computer Technology Task Force
Superintendent of Public Instruction
#7510 Armstrong St., S.W. #FG 11
Tumwater, WA 98504

This task force operates a telephone exchange for Washington educators which can be reached at 206/753-2858 or 206/753-6747. The task force has also published six handbooks on educational technology. One handbook is devoted to software evaluation.

Computer-Using Educators (CUE)
1776 Educational Park Drive
San Jose, CA 95133

Operates a software library, a microcomputer demonstration center, and an in-service training program.

Educational Products Information Exchange Institute (EPIE)
P.O. Box 620
Stony Brook, NY 11790

An educational consumer advocacy group which, in conjunction with the Microcomputer Resource Center at Columbia University Teachers College, publishes detailed critical reviews of commercially available educational software.

Florida Center for Instructional Computing
College of Education
University of South Florida
Tampa, FL 33620

Funded in part through the Florida State Department of Education, the FCIC serves Florida educators by compiling software reviews and maintaining an educational software index.

Helping Schools and Community Colleges to Choose Microcomputer Courseware
c/o Dr. Vicki Blum Cohen
Microcomputer Resource Center
Box 18, Teachers College
Columbia University
New York, NY 10027

This project is producing detailed reviews of courseware in math, science, and communication skills designed for elementary through community college levels. EPIE publishes the reviews periodically.

Instructional Materials Division
Department of Education
State of New Mexico
Santa Fe, NM 87501-2786

The Instructional Materials Division reviews educational software and publishes a list of state adopted software.

Materials Review and Evaluation Center
North Carolina Dept. of Public Instruction
Raleigh, NC 27611

Reviews educational software and publishes a list of highly rated pieces, "Advisory List of Instructional Media," which is sent to all 50 state departments of education in the U.S. and to schools throughout North Carolina.

Michigan Association for Computer Users in Learning (MACUL)
33500 Van Born Road
Wayne, MI 48184

Collects and reviews public domain educational software for the Apple. Publishes reviews of educational programming.

Micro Co-Op
P.O. Box 432
West Chicago, IL 60185

A software cooperative that distributes Apple and Atari software to members at reduced rates. Its bimonthly newsletter describes and compares programs.

Microcomputer Education Applications Network (MEAN)
256 North Washington Street
Falls Church, VA 22046

Aids educators in developing and selling software. Publishes a quarterly newsletter which contains information on software services.

Microcomputer Resource Center
Teachers College, Columbia University
525 W. 121st Street
New York, NY 10027

Maintains a collection of hardware, software, journals, and books, which educators are welcome to use. Runs seminars and workshops on microcomputer applications in the schools.

Microcomputer Software and Information for Teachers (MicroSIFT)
Northwest Regional Educational Laboratory
300 SW 6th Avenue
Portland, OR 97204

Disseminates descriptive and evaluative information about educational software. Its reviews are available through state and local education agencies, various periodicals, and the RICE database of the Bibliographic Retrieval services computerized information system.

National Council of Teachers of Mathematics (NCTM)
1906 Association Drive
Reston, VA 20091

Publishes software reviews in its various periodicals. Developed Guidelines for Evaluating Computerized Instructional Materials.

SOFTSWAP
c/o Ann Lathrop
San Mateo County Office of Education
333 Main Street
Redwood City, CA 94063

Collects, evaluates, and modifies educational programs, and makes them available free of charge to educators who copy them at the center. Operates a software exchange which allows any educator who contributes a program to request one in exchange. Sells public domain software at low cost.

Technical Education Research Centers, Inc. (TERC)
8 Eliot Street
Cambridge, MA 02138

Conducts workshops and provides information services relating to educational computing. A software review service is in the planning stage.

Periodicals And Reports Devoted To Software Reviews

Computer Software: A Manual for Teachers
Teacher Center for Montana
215 S. 6th Street West
Missoula, MT 59801

A collection of reviews of software in Language Arts, Science, Social Studies, etc.

Courseware Report Card
150 West Carob Street
Compton, CA 90220

5 issues per year. Separate elementary and secondary editions review educational software for Apple, Radio Shack, Atari, Commodore, and Texas Instruments.

Digest of Software Reviews: Education
1341 Bulldog Lane, Suite C
Fresno, CA 93710

Four issues per year; describes 50 programs per issue.

Dvorak's Software Review
704 Solano Avenue
Albany, CA 94706

Eight issues per year.

Journal of Courseware Review
The Apple Education Foundation
20525 Mariani Avenue
Cupertino, CA 95014

3 issues per year. Contains signed critical reviews of commercial educational programs for the Apple II.